



FRIDAY, DECEMBER 20, 1901.

CONTENTS

ILLUSTRATED:

Player-Baldwin Oil Burning Consolidation Locomotive—Atchison, Topeka & Santa Fe, with an Inset	869
Yards for Sorting Freight Terminal Classification	870
The Pennsylvania Tunnel to Long Island	871
A Pressed Steel Car Roof	872
Electric Locomotives for Shops	874
The New Dry Dock at Baltimore	875
Belt-Driven Flue Welding Machine	877

CONTRIBUTIONS:

Locomotive Smoke Abatement in Cleveland	869
---	-----

EDITORIAL:

Heavy Freight Locomotives of the Atchison, Topeka & Santa Fe	878
The Pennsylvania Tunnel Across New York	878
November Accidents	879
Editorial Notes	878, 879
New Publications	879
Trade Catalogues	879

MISCELLANEOUS:

The Seneca Collision	871
Recent Locomotive Construction and Performance	872
Government Regulation of Working Hours in England	874
The Standard Box Car	875
The Report of the Isthmian Canal	875
From the Annual Report of the Secretary of Agriculture	876
The Use of Electricity on Railroads	876
Train Accidents in the United States in November	876

GENERAL NEWS:

Technical	880
The Scrap Heap	881
Locomotive Building	881
Car Building	881
Bridge Building	881
Meetings and Announcements	882
Personal	882
Elections and Appointments	883
Railroad Construction	883
General Railroad News	884

Contributions

Locomotive Smoke Abatement in Cleveland.

The City of Cleveland,
Office of Supervising Engineer, Dec. 13, 1901.
TO THE EDITOR OF THE RAILROAD GAZETTE.

Your letter of Dec. 9, in regard to smoke abatement on railroads has just been received. I am very glad to give you further information in regard to the methods adopted by this department in dealing with the railroad problem. I have no doubt that at some time in the future the use of coke or some form of smokeless coal will be insisted on in this city, as it is in New York and Boston. A change of this kind at the present would, however, be too radical, and would hardly be justifiable when the smoke from stationary plants is still excessive.

Before beginning any systematic work with the locomotives, consultations were held with the officials of all railroads coming into Cleveland, and the subject of smokeless firing was discussed in all its details. Those present at the meeting were mostly master mechanics and road foremen. It was the consensus of opinion at that meeting, that a large portion of the smoke could be eliminated by adopting the one shovel system of firing, by leaving the fire-door slightly ajar immediately after firing, together with such aid from brick arches, combustion tubes, and blowers as should be available. The officials of the various roads promised to give instructions in regard to firing, and to see that they were carried out. Subsequently a meeting was held at which were present representative engineers and firemen from the various roads, to whom the subject was presented in a similar manner. Almost without exception they expressed themselves as in favor of the one-shovel system, and promised to do their best.

In March, 1901, an assistant engineer was appointed, who had been master mechanic on a prominent road for several years, and who was thoroughly familiar with engine running, and engine conditions. Since that date, he has devoted all of his time to this portion of the work. He has made in all over 1,500 observations on nearly 400 different engines. There are six principal lines operating in Cleveland, the Cleveland, Cincinnati, Chicago & St. Louis; Lake Shore & Michigan Southern; New York, Chicago & St. Louis; Erie Railroad; Cleveland & Pittsburgh, and Cleveland Terminal & Valley. About 250 observations have been made on each road since last March.

The method of taking readings from locomotives can be described as follows: Taking some favorable position on a comparatively straight piece of track where the line can be seen for a considerable distance in either direction, the inspector takes readings on each locomotive as it comes in sight, taking them at regular intervals of from three to five seconds as long as the stack is visible. The smoke is graded on a scale of 100, which means dense black smoke. As the time of observation is very

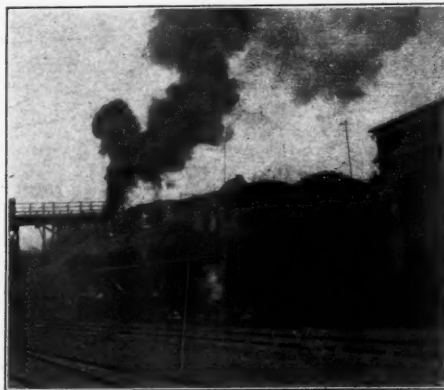
limited in most cases, it is necessary to record the readings rapidly and accurately. To make this possible, a graphic log has been adopted on which the readings can be located by dots. A broken line joining these can be put in subsequently, and thus give a graphic diagram of the variation of smoke. This form contains also the necessary blanks for data as to number of engine, road, locality, date, time, duration of observations and class of service. The average amount of smoke during the time of observation is easily calculated by adding together the different readings, and dividing by the total number. These cards are made in duplicate by the use of carbon paper, and copies are sent within 24 hours to the roads interested. The master mechanic or road foreman is thus kept informed almost daily of the smoke conditions on his road, and can investigate each case at once, and censure or commend as the occasion demands.



No. 1.—Smoke in Cleveland.

About once in two weeks the averages are collected together in a bulletin, of which two are sent to the road in question; one of these can be retained in the office of the master mechanic, and the other posted in the round-house, or such place as will give the crews an opportunity to see it. I send you a sample of bulletin, this being a copy of an actual list made for the Pennsylvania Lines. [We omit the columns of date, locality, time and number of engine.—Editor.] These bulletins and engine cards are accompanied by letters from this office calling attention to any conspicuous violation of the rules, and also commending where it is deserved.

The officials of the various roads have shown a welcome spirit of co-operation by issuing proper instructions, by posting the bulletins, and by disciplining, in one way and another, careless firemen or engineers. On some roads the crews are suspended, and sent to this office to discuss the matter. On others they are dealt with directly by the road. The crews are given an opportunity to explain the cause of the smoke, and if it



No. 2.—Smoke in Cleveland.

seems to be due to leaking flues, poor coal, or overload, I do not hesitate to criticize the management.

As an illustration I send you two photographs. No. 1 represents a freight engine on the Lake Shore & Michigan Southern hauling a train of about 65 empties with practically no smoke, although the engine was working hard. No. 2 shows a Big Four passenger engine just starting out from the Union Station with a heavy train. The engine was working splendidly and without smoke, when suddenly the drivers slipped; the effect on the fire was immediate, and dense volumes of soot rolled from the stack. In the picture the line between the white and black can be plainly seen, showing the point at which a sudden increase of speed tore up the fire.

The improvement on the various roads since this work was undertaken is quite marked. Readings taken from about 20 locomotives on each road previous to the issuance of instructions, showed an average of about 30 per cent. of black smoke. To-day on these same roads our readings average less than 15 per cent., and in several instances we have obtained averages of less than 10 per cent. from a group of 25 engines. The bulletin which I send you is the best of any we have made, the average being a trifle over 6 per cent. The previous bulletin for this same road was less than 8 per cent. This result is to be attributed to two principal causes; first regular and systematic inspection with almost daily reports;

second, instructions given to the men by the officers of the road, and the careful inspection by their own traveling firemen and engineers.

The performance which may be expected of any given locomotive depends upon the class of engine, and the grade of service. If engines are equipped with brick arches and combustion tubes, the smoke average will be less than for engines not so equipped. The use of the Bates fire-door is also a distinct aid to perfect combustion. From our experience with switching locomotives, it is evidenced that less than 10 per cent. of smoke is a condition easily realized in this kind of work. Passenger engines, except at the first few minutes after starting, can go through the city with practically no smoke. We frequently get averages of from zero to 2 per cent. in this class of service. With freight engines the case is somewhat different. If the engine is loaded about up to its capacity, and the grades are heavy, it will sometimes be impossible to prevent black smoke coming from the stack. It is believed to be possible, however, to reduce the average to 10 per cent. with careful firing. In this city it is now about 15 per cent.

It is perhaps needless to say that eternal vigilance is the price of success. If the inspections on any road were to be relaxed for a month, there would be a gradual subsidence to the old conditions. The time will probably come when the use of smokeless coal within the city limits will render all these precautions unnecessary.

C. H. BENJAMIN, Supervising Engineer.

Part of a Bulletin on the Cleveland & Pittsburgh Division.		
Service.	Duration smoke.	Per cent.
Passenger	3 min.	.04
Switching	3 min.	.09
"	3 min.	.00
"	3 min.	.15
"	3 min.	.07
Freight	3 min.	.00
Passenger	2 min. 40 sec.	.12
Switching	3 min. 10 sec.	.06
"	2 min. 40 sec.	.05
"	3 min.	.06
Freight	3 min.	.09
"	2 min. 45 sec.	.09
Passenger	1 min. 30 sec.	.00
Freight	3 min. 5 sec.	.08
"	3 min. 5 sec.	.14
"	3 min.	.06
Switching	3 min.	.00
"	3 min.	.04
"	3 min. 5 sec.	.10
"	3 min.	.16
"	3 min.	.13
"	3 min.	.00
Passenger	3 min. 10 sec.	.00
Freight	2 min. 45 sec.	.00
Switching	3 min.	.00
Average		.062

The Player-Baldwin Oil-Burning Consolidation Locomotive—Atchison, Topeka & Santa Fe.

[WITH AN INSET.]

Elsewhere in this issue is a synopsis of what has been done on the Santa Fe system in three years of heavy locomotive building; also a brief forecast of what is to be done in the immediate future. Illustrations on the Inset show the heavy consolidation oil-burning locomotive to which we have referred as designed by Mr. John Player, Superintendent of Machinery, and built by the Baldwin Locomotive Works. The work of the builders included much of the design in detail. The locomotive was built in a remarkably short time and the boiler drawing from which the builders worked was originally intended for a much lighter locomotive.

Our illustrations show general views and also details of the most important features, and before describing we give here a general idea of the scope of the design. The total weight in working order (weighed) is 214,600 lbs., the engine truck carrying 23,200 lbs. of this and the driving wheels 191,400 lbs., or 47,850 lbs. per axle. The tender, loaded with 6,000 gals. of water and 2,200 gals. of oil, weighs 110,000 lbs. The cylinders are Vauclain compound, 17 and 28 x 32 in. The valves are balanced piston, 13 in. in diam., 5 1/4 in. travel in full gear, steam lap h.p. 3/8 in., l.p. 1/4 in., exhaust clearance h.p. 1/4 in., l.p. 3/8 in., lead in full gear, h.p. 0 in., l.p. 1/8 in. The working steam pressure is 210 lbs. per sq. in., and the driving wheels are 57 in. in diam. The tractive effort, with 210 lbs. steam pressure, is 45,800 lbs., working compound, and about 55,000 lbs., with high-pressure steam in the low-pressure cylinders. The frames are cast-steel. The valve-gear is well conceived, giving the valve yokes a central hold upon the valves. The motion-bar, rocker, and valve-rods are shown so fully as to require no further comment.

The total heating surface is the greatest of which we have any record for locomotive work. The three fire-boxes have 165 sq. ft. in all, the 652 tubes 1 1/4 in. o.s. diam., give 4,031 sq. ft., and the combustion chamber 70 sq. ft., making the total 4,266 sq. ft. The Lehigh Valley's heavy pushers have 4,105 sq. ft., the biggest locomotive in the world, P. & L. E. No. 150 class, has 3,805 sq. ft., the Santa Fe Prairie type 3,738 sq. ft., the New York Central (Central-Atlantic type) 3,505 sq. ft., the Lake Shore class J 3,343 sq. ft., and so on down the scale.

This Santa Fe boiler is of the short wagon-top type, with the third course straight, 88 in. internal diameter. The back course is the frustum of a cone of the taper shown and the boiler-head is straight. Within these two courses are three corrugated fire-boxes, 28 in. clear diameter inside, 84 in. long over head sheets, and a combustion chamber into which the forward ends of the fire-boxes open. The combustion chamber is 40 in. long inside of head sheets and is a circle struck from a radius of 39 1/2 in., inside, up to the point shown where this circle is merged into the horizontal line of the crown-sheet. The

radii of the corner curves are 12 in. The combustion chamber is so related to the boiler shell as to give 4-in. water space below and as far up the sides as the true circle extends, and the centers of the three fire-boxes are equidistant in the circumference of the largest circle that could be struck from the center of the combustion chamber to thus locate them and flange their ends to the back head of the combustion chamber and the back head of the boiler. The combustion chamber is of $\frac{3}{8}$ -in. steel and the fire-boxes are of $\frac{1}{2}$ -in. steel. Radial stays $\frac{7}{8}$ in. and 1 in. in diam. are used around the circular parts as shown, and there are four rows of sling stays over the crown of the combustion chamber, attached to T-bars spaced in the order of the illustration.

The areas of the boiler-head and of the back head of the combustion chamber that are not directly held by the joints with the fire-boxes are held by three groups of fore-and-aft tie-rods, $1\frac{1}{4}$ in. in diam., with thread body enlarged, screwed through both heads. Nuts and washers are used on the rod-ends and there are, in all, 25 tie-rods. On the inside of the boiler-head at a point 29 in. above the center line of the boiler there is a steel T riveted. On the sides of the shell are angles to correspond in the height of their top faces, and to these anchorages is bolted a steel plate extending from side to side of the shell and 24 in. forward from the inner face of the T to which it is fastened on the boiler head. This plate is perforated with two rows of 4-in. holes and serves the double purpose of head-stay and "wash" plate. The further staying of the boiler is indicated in the drawings.

The outside diameter of the first ring of the boiler is 74 in. and the opportunity to shorten the front end to 52 in. has been promptly taken. The tubes are 13 ft. 7 in. long over sheets. The manner of welding and riveting the longitudinal seams of the combustion chamber and the boiler shell is given in the illustration, with other points that are worth careful reading.

The piping for oil burners is shown in place on the boiler-head. Oil in the tank is heated by exhaust steam from the air-pump, as shown. The brick lining and "piers" for impingement of the jets and flame in the fire-boxes are also shown.

As much may be learned from those illustrations as can be said of them at this time. It is an arrangement that may be slightly modified in service, and which is very interesting to begin with. The brick lining extends forward 48 in. from the fire door and covers the entire inside of the fire-box that far. The tip of the burner is set at the center line of the fire-box and the central "pier" of brick rises to the center-line of the fire-box, giving a clear sweep at both sides of it. In the front end of the fire-box there is a double ring of fire-brick that protects the flange joint and also helps to mix gases and air as they enter the combustion chamber.

This description, with our illustrations, will probably make clear one of the most interesting designs that we

Dome, diameter	31½ in.
Fire-boxes, length (over head sheets)	2 ft. 0 in.
Fire-boxes, diam., inside	2 ft. 4 in.
Fire-boxes, diam., outside	2 ft. 8 in.
Comb. chamber, length	3 ft. 4 in.
Fire-boxes, material	Steel
Fire-boxes, thickness of sheets	½ in.
Fire-boxes, brick arch	Yes
Fire-boxes, water space (see illustrations)	
Tubes, number	652
Tubes, material	Iron, No. 13 W. G.
Tubes, outside diameter	1½ in.
Tubes, length over sheets	13 ft. 7 in.
Smoke-box, diameter inside	74 in.
Smoke-box, length	52 in.
Exhaust nozzle	Single
Exhaust nozzle, Permanent, with interchangeable thimbles	4½, 4 and 5 in.
Exhaust nozzle, diameter of thimbles	4½, 4 and 5 in.
Exhaust nozzle, distance of tip below center of boiler	7 in.
Stack, least diameter	15½ in.
Stack, greatest diameter	17½ in.
Stack, height above smoke-box	3 ft. 0 in.

Tender.

Type	Swivel trucks
Tank capacity for water	6,000 gals.
Oil capacity	2,200 gals.
Kind of material in tank	Steel
Thickness of tank sheets	¼ in. and ⅜ in.
Type of under-frame	10-in. steel channel
Type of truck	Player, cast steel
Type of truck with swinging motion or rigid bolster	Rigid
Diameter of truck wheels	34½ in.
Diameter and length of axle journals	5 x 9 in. M. C. B.
Distance between centers of journals	6 ft. 4 in.
Diameter of wheel fit on axle	6½ in.
Diameter of center of axle	5½ in.
Type of truck bolster	Player, cast steel
Type of truck transom	Player, cast steel
Length of tender frame over bumpers	23 ft. 10½ in.
Length of tank	22 ft. 6 in.
Width of tank	9 ft. 6 in.
Height of tank, not including collar	4 ft. 2 in.
Height of tank over collar	6 ft. 1 in.
Type of back draw-head	Tower coupler, tandem type.
Miner mail, iron draft rigging	

Special Equipment.

Wheel centers	Seaboard Steel Casting Co.
Tires and axles	Standard Steel Works
Sight-feed lubricators	Nathan double
Front and back couplers	Tower & Miner
Safety valve	Crosby
Sanding devices	Leach
Injector	Nathan Simplex
Driver brake equipment	American O. S. equalized
Tender brake equipment	Westinghouse automatic
Tender brake-beam	Monarch "Solid"
Tender brake shoe	B. L. Works
Driver brake shoe	Ross-Mechan
Air pump	Westinghouse
Steam gages	Crosby
Engine truck springs	B. L. Works
Driving springs	B. L. Works
Tender springs	B. L. Works
Piston-rod packings	Jerome metallic
Valve rod packings	Jerome metallic
Linstrom siphon on tender	

Yards for Sorting Freight Terminal Classification.

There are several examples of what may be called general design in the freight terminals of this country. Such a terminal is laid out with a full knowledge of the handling and marketing of the freight which is transported. It is therefore natural that the best examples of such

city, with no connections beyond. In such a case the yard becomes a city freight station yard or a yard controlling several city stations which would, in fact, form only one item of a system covered by the general phrase "terminal yard" as herein used. Considered in general the terminus of a railroad refers not only to city freight stations, important as they may be, but also to connections beyond either by rail or water, frequently by both, and to deal with the whole as a system requires an organization which touches upon almost every branch of trade and commerce and every form of personal effort.

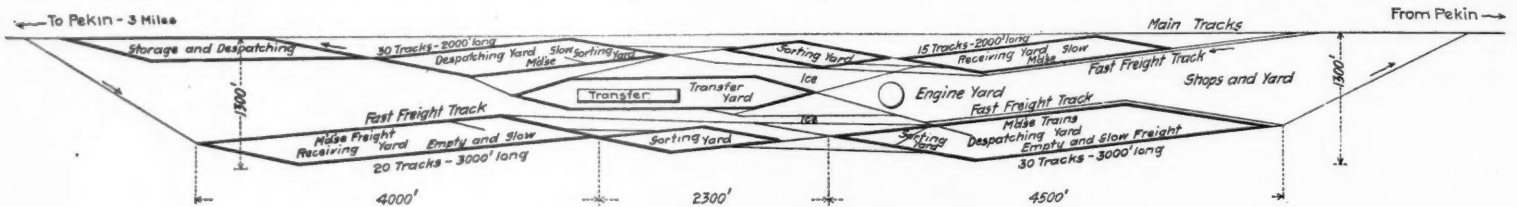
So varied are the interests which are affected and the commercial methods by which they are controlled that it is vital to the scheme of any theoretical design that some general classifications should be assumed. If such general divisions of terminal work could be made to permeate the whole system of transportation we would see an ideal condition of things, but this consummation can only be obtained by a much closer understanding of commercial and transportation matters than has ever been worked out in rates, revenue and expenses, in this country at least, and we can now only mention it as a generally recognized desire.

How then should we group the various articles of commerce in a terminal design which is intended at one and the same time to be the kindly master of commercial supply and the ready servant of commercial demand?

As a first and primary division affecting the terminal work of a railroad we will mention the separation of those articles requiring direct delivery both in and outbound from those articles which require storage in either one direction or in both directions. This question of storage should be defined in a large way, but it is one of the questions which will require a very comprehensive understanding to fix definitely. It is one of the unsettled questions and the general acceptance of pay storage in storehouses and pay and free storage in freight houses and freight cars of various commodities and for different periods is still an academic question.

However, for the purposes of this discussion we will call direct-delivery articles inbound, those which should be unloaded from the cars in one day or less and removed from the freight house in two days or less. Perishable freight and live stock include commodities which from their nature require special attention at terminals; these therefore can be placed in classes by themselves.

Again, small lot, or less than carload freight of all kinds, both perishable and merchandise, can be considered as a terminal item by itself. The very fact that it comes to a terminal in both directions in mixed lots necessitates its handling and separation by the railroad company, and this fact places it on much the same general footing as regards terminal work as we have placed perishable freight and live stock. The latter require quick handling from the necessities of their nature, whilst less than carload freight requires it from the necessities of economical operation if not, as is generally the case, from the



Plan of Division or Sub-Terminal Yards—Capacity 6,000 Cars Daily.

have shown during a year of startling developments in locomotives. All other essential information is given in the general description below:

Atchison Oil-Burning Consolidation Engine.

Simple or compound	Vauclain compound
Fuel	Oil
Weight on drivers (scale weight)	191,400 lbs.
Weight on truck wheels (scale weight)	23,200 lbs.
Weight, total (scale weight)	214,600 lbs.
Weight tender loaded (estimated)	110,000 lbs.
Wheel base, total, of engine	24 ft. 6 in.
Wheel base, driving	15 ft. 4 in.
Wheel base, total (engine and tender)	54 ft. 2½ in.
Length over all, engine	39 ft. 8½ in.
Length over all, total, engine and tender	65 ft. 7½ in.
Height, center of boiler above rails	9 ft. 2 in.
Height of stack above rails	15 ft. 4 in.
Heating surface, fire-boxes	165 sq. ft.
Heating surface, tubes	4,031 sq. ft.
Heating surface, comb. chamber	170 sq. ft.
Heating surface, total	4,266 sq. ft.
Drivers, diameter	57 in.
Drivers, centers	Cast steel
Truck wheels, diameter	30 in.
Journals, driving axle, size	Main, 9½ x 12 in.; others, 9 x 12 in.
Journals, truck axle, size	6½ x 10½ in.
Main crank pin, size	6½ x 6½ in.
Cylinders, diameter	H. P., 17 in.; L. P., 28 in.
Piston, stroke	32 in.
Piston rod, diameter	4½ in.
Kind of piston rod packing	Jerome metallic
Main rod, length center to center	10 ft. 10 in.
Steam ports, length (circular)	29½ in.
Steam ports, width	1½ in.
Exhaust ports, length (circular)	29½ in.
Exhaust ports, width	4½ in.
Bridge, width	3 and 2½ in.
Valves	13 in. dia. Balanced piston
Valves, greatest travel	5½ in.
Valves, outside lap	H. P., ¾ in.; L. P., ¾ in.
Valves, inside clearance	H. P., ¾ in.; L. P., ¾ in.
Valves, lead in full gear	H. P., 6 in.; L. P., ¾ in.
Roller, type	Player (Santa Fe)
Roller, working steam pressure	210 lbs.
Roller, material in barrel	Steel
Roller, thickness of material in barrel	¾ in. and 1½ in.
Roller, diameter of barrel	74 in.
Seams, kind of horizontal	Butt jointed, double covering strips
Seams, kind of circumferential	Double riveted, 1½-in. riv.
Thickness of tube sheets	½ in.
Thickness of crown sheet	¾ in.
Crown sheet stayed with	Inverted T-iron crown-bars

design are to be found at the terminals of a road carrying largely one article, like coal or grain, and it can be readily seen that where such an article is "graded" or separated by grades and classes and not by ownership that the design will be more simple than under other conditions. Thus in the case of some anthracite coal carrying roads where the different sizes from the various mines are kept separate and distinct from each other some system of subsidiary yards must be established in order to keep the several mines or groups of mines on approximately an equivalent, as well as individual, basis as regards delivery. The yards at Hoboken on the North River opposite New York were laid out as examples of this kind and the design was to attach to each coal shipping pier handling the product of a certain class of mines three or four small yards, each consisting of a number of short tracks, where the loaded cars with any special size of coal could be placed together to be moved to the pier to be unloaded and where the empty cars, after the unloading, could be placed and held till removed by available power. In this way each group of mines was kept distinct in delivery and independent in the supply of its market as its contracts changed. We all appreciate that no matter how small a terminal yard may be, whether it controls one pier or station or many of them, it should be prepared to cover the operations of, a, sorting the cars, and of b, holding the cars for the movement in each direction—inbound and outbound—on the same general principle as at a division yard.

How to carry out this principle at large terminals may be considered a legitimate subject for theoretical design which, of course, will be modified with varying conditions in relation to property and cost of construction and the physical and commercial requirements of the terminus, therefore the accompanying plans of division and terminal yards are only presented as general examples.

The phrase terminal yard should not be understood merely as representing the end of a railroad leading to a

necessities of the consignees. Yet another item which we may place with the above consists of carload shipments of high-class freight which pay high rates and deserve quick service, and are more important in value than large in amount. At present we will include in this class articles covered by first, second and third-class rates in carloads in existing freight tariff classifications. Another item which, although we cannot class it with the others strictly in the terminal work consists of "hurry shipments" in carloads, which may include at any time particular shipments of the lowest as well as the highest class of commodity from sand and coal to paper and tobacco. If these items cannot be handled at high-class terminal stations they should be handled in such a way as to receive preference, and as this requires more than ordinary attention they should be given a place in the same general class. It will be noticed that very largely the articles in this general class are shipped in packages, although many of them are not packed but are shipped in bulk, and this characteristic must be kept in view in considering terminal work.

This distinction brings us to another general class consisting of low class merchandise in packages and all kinds of material in bulk, such as coal, ore, grain, stone, lumber and similar freight.

Another separate class is freight loaded in separate cars to and from connections by rail, which requires only a system of interchange yards and no buildings or appliances.

Another class consisting of all kinds of freight to and from connections by water, which we will term import and export freight, can be handled in two methods, according to the physical condition of the terminals. If the city stations are on the water front it may be possible to combine the city business, inbound and outbound, with the corresponding import and export business. If this cannot be done a separation of freight must be made and separate terminals established. The accompanying plan of

a terminal plant is intended to illustrate both methods, one where the combination is possible, the other where the separation is necessary. Let us now make a statement of the terminal classes we have indicated.

1. City Business.—Highly perishable freight in packages and bulk in carloads for direct delivery, in and outbound, and for storage inbound.

2. City Business.—Less than carloads freight, all kinds, and carloads of high-class merchandise and hurry freight, all in packages, also of common perishable in packages and bulk, for direct delivery, in and outbound and for storage inbound.

3. City Business.—Hurry freight in bulk in carloads for direct delivery in and outbound.

4. Connecting Railroads.—Cars loaded with stock and perishable; less than carload freight all kinds; high-class merchandise; and "hurry freight," in both packages and bulk; for direct delivery to and from other railroads.

5. Import and Export.—Less than carloads all kinds; carloads of perishable all kinds; carloads of high-class merchandise and hurry freight in packages; for direct delivery and storage.

6. Import and Export.—Hurry freight in carloads in bulk for direct delivery in and outbound, and storage inbound.

7. City Business and Connections by Rail and Water.—Live stock in carloads for direct delivery and for storage in and outbound.

8. City Business.—Low-class merchandise in packages in carloads for direct delivery in and outbound, and for storage inbound.

9. City Business.—Raw and manufactured material in bulk in carloads for direct delivery in and outbound, and for storage inbound.

10. Connecting Railroads.—Cars of raw and manufactured material in bulk and low-class merchandise in packages for direct delivery to and from connections by rail.

11. Import and Export.—Low-class merchandise in packages in carloads for direct delivery and storage.

12. Import and Export.—Raw and manufactured material in carloads in bulk for direct delivery and storage, in and outbound.

Let us start then with the assumption that freight tariffs will show the terminal classes and that all manifests or way bills (which are subject to the Auditor's examination) and all tickets or cards which accompany and direct the movement of loaded cars on a railroad will be each and every one plainly marked with the class of terminal freight to which it belongs and that trains are to be made of solid blocks or solid trains of say 1, 2, 3, 4, 5, 6 and 7 terminal freight (especially of 1 and 7) for one or several destinations, and of 8, 9, 10, 11 and 12 terminal freight. It is true that at rural stations and small towns all freight may be placed on one siding, but there is no reason why the different classes should not be separated in the movement on the road and in the yards, and in the case of large cities and ports, the separation is of advantage and really necessary throughout the handling and movement. The accompanying plans of yards and terminals are presented with the purpose of carrying into effect the above-mentioned separations of terminal work by increasing the facilities for sorting trains. The "division or sub-terminal yard" shows a design at the junction of two divisions or the outer yard of a large city and port, which we term a sub-terminal yard. Not infrequently we find that the general design of a division yard arises from an inordinate desire to save land and to lay out tracks parallel to the main line and to each other. This method frequently results in placing end to end and interlacing two yards for movement in opposite directions and in this way prevents a healthy systematic development. In the accompanying design each system instead of end to end is placed side by side, thus taking up a broader strip of land, but not so long. The tracks are not parallel but are laid out for a system of three yards, one, a receiving yard to free the power; two, a sorting yard for a preliminary classification; three, a despatching yard (with no fixed assignment of classification tracks but to be used according to advance telegraphic report of the number of cars by classes for each destination) where the cars can be held for available power outbound. In this despatching yard the difference between the engine rating length of a slow freight train of (8) and (9) cars and a faster train of (2) cars is taken advantage of for a small sorting yard to put the (2) train in station order. Available space is used for a transfer to consolidate and separate less than carload business for city and export or import or other classifications that may be necessary. Connections are made for fast movement of say 1 and 7 trains around the yards and an opportunity is allowed for systematic development of the plant.

The plan of the terminal layout proper may be of the usual design. All freight houses where markets must be provided for the commodities or where storage is needed, to be built two stories high with vertical lifts, and possibly horizontal conveyors. The actual terminal yard itself should be largely made up of clusters of small tracks for the purposes of quick classification, with the sub-terminal yard as a quick source of supply and a ready reservoir for overflow.

It is hardly necessary to add that there is an immense advantage obtained by a hearty co-operation of all departments. The one aim of a railroad corporation is the transportation of freight and passengers and whilst passengers classify themselves by quality and destination

the best appliances must be provided for classifying freight and the one object which every department must have in plain view is the economical, orderly, appropriate movement from shipper to consignee. G. S.

The Pennsylvania Tunnel to Long Island.

Since we published, two weeks ago, a short description of the plan for bringing the Long Island Railroad into New York City, matters have taken a different but not unexpected turn; that is, the plan for carrying the Long Island Tunnel on westward to connect with the Pennsylvania Railroad somewhere in New Jersey has been developed. The public is not yet informed where the diversion will be made from the Pennsylvania main line, or what the route will be for the tunnel under Jersey City, but the plan which is shown herewith is official, so far as it goes, that is, from the Hudson River to Long Island City.

So far as we learn there will be two single track tunnels across the North River and as far as the central station to be established in New York City; then three single track tunnels eastward to carry the roads to Long Island. Obviously when good ground is reached on Long Island the style of tunnel construction will change from the tube to the ordinary tunnel section, and then we suppose it will become cheaper to concentrate the tracks in one tunnel. By the tube construction it is cheaper to build two single track tunnels at once than one double track.

The preliminary design of the great station in New York City is worked out, but we suppose that it would hardly be thought expedient to make that public now, as it is subject to change. It will be observed that the route now laid down crosses Manhattan Island between Thirty-first street and Thirty-third street, and that the New York City station is placed between Seventh and



Plan of the Proposed Pennsylvania-Long Island Tunnels.

Tenth avenues. Naturally this gives a pretty liberal allowance of space for the final location of the station. It is said that another station is projected at Fourth avenue, at which traffic can be conveniently interchanged with the underground Rapid Transit line, as well as with the surface road on Fourth avenue.

It is said that the grades, as the line is now projected, will be 1.2 per cent. on the New Jersey side and 1.5 on the Long Island side. The tunnels will be 80 ft. or thereabouts below high water at the eastern side of the Hudson River. Between Seventh and Eighth avenues, in New York City, the tunnels will be 45 ft. below the surface, which is the highest elevation reached; at Broadway they will be 55 ft. underground; and at Fourth avenue, 60 ft. At the East River pier line the tunnels will be but 30 ft. below river bottom which, however, is rock, whereas in the North River it is silt.

The tube tunnels across the North River will be built on some new designs prepared by Messrs. Jacobs & Davies, Consulting Engineers, and patented, as we understand, by Mr. Jacobs. According to the very slight descriptions which have been made public of this method of tunneling, the tubes will be supported at intervals by piers which will go down through the silt to hardpan. The tunnels are to have an inside diameter of 18 ft. 6 in. It goes without saying that it is proposed to work the traffic through these tunnels by electricity.

Mr. Cassatt, in an authorized statement in the newspapers, says that the Long Island Extension Railroad Company will withdraw its application for powers to build a terminal on Manhattan Island. It is now proposed to build under the charter of the Pennsylvania-New York Extension Railroad Company, just organized, and a New Jersey railroad company to be organized. Mr. Cassatt says further that the company has bought most of the property necessary for its principal station and will go on either by purchase or condemnation to secure whatever further land is necessary; and he adds that work of construction will be begun as soon as the necessary authority is procured. The directors of the Pennsylvania-New York Extension Railroad Company are: A. J. Cassatt, Thomas De Witt Cuyler and Clement A. Griscom, of Haverford, Pa.; John P. Green, of Rosemont, Pa.; Charles E. Pugh, of Overbrook, Pa.; Sutherland M. Prevost and W. H. Barnes, of Philadelphia; Samuel Rea, of Bryn Mawr, Pa., and William H. Baldwin, Jr., of New York City.

The standard gage of railroads in the Argentine Republic became 5 ft. 6 in., not in imitation of the mother country, Spain, as might be supposed, but by the accident that when the first railroad was under construction, and orders for materials and rolling stock were sent to England, without specifying the gage, it was to the advantage of the parties receiving the order to market a quantity of material which had been prepared for a railroad in an English colony—presumably Canada,

The Seneca Collision.

Following is the substance of the report made by the coroner who, with a jury, held the inquest on the body of one of the passengers killed in the collision at Seneca, Mich., Nov. 27:

Said collision was caused by the negligence of the said Wabash Railroad Company and the trainmen of train No. 4. The railroad company was negligent in its failure to provide train No. 4 with a head-end brakeman according to rule No. 110 of said company, and in failing to provide proper signals at the place of meeting of said trains 4 and 13. The engineer, Aaron T. Strong, was negligent in failing to properly understand and obey order No. 82. The conductor, George J. Martin, was negligent in failing to signal said engineer to stop, and in failing to apply the air-brake when said engineer did not give the proper signal immediately after the station signal at Seneca, according to rule 41 of special rules of said company. The fireman, John Bastian, was negligent in failing to remind the engineer of order No. 82, when said engineer failed to give the proper signal and to slow up at Seneca; and the brakeman, Anthony W. Dittman, was negligent in failing to signal the engineer to stop, and in failing to apply the air-brake until after said train had passed the station when said engineer did not give the proper signal on approaching Seneca.

Railroad Commissioner C. S. Osborn, of Michigan, has issued a circular to the general managers of all the railroads in that State, in which he says:

The recent terrible accident that occurred on the Wabash Railroad at Seneca, Nov. 27, whereby a large

number of passengers and employees lost their lives, has given rise to a great deal of discussion as to the sufficiency of the present standard code of train rules in use upon the railroads in the State, and whether some changes and improvements can be made in such code that will result in greater safety to the traveling public, and the saving of human lives.

In this case it appears that the trainmen operated strictly in accordance with the requirements of the code. The order, which was a complex one, making two meeting points in one sentence, was delivered to the conductors and engineers and was read by them to the brakemen and firemen.

The engineer of one of the trains seems to have forgotten that part of his order requiring him to meet one train at Seneca, and ran past that station, and although the other members of the crew are reported to have understood the order, before any signal could be given to the engineer the collision had occurred.

While it is undoubtedly true that the standard code is the product of the best thought of the most experienced operating railroad men in the country, who were actuated in its preparation by a desire to take all possible steps to prevent accidents, still it is possible that recent experience may suggest some changes in such code, that will result in the saving of life; and if this is true, such changes should receive careful consideration.

A system has been used by some railroad companies requiring that at each meeting point the order board, or a signal be displayed, calling attention of the train crew to the fact that it is a meeting point, thus serving as an additional safeguard, without any additional expense to the company, and this system would appear to be worthy of consideration.

On some roads it is also required that upon approaching a meeting point, the conductor shall give a signal to the engineer, reminding him of the orders, and the same must be responded to by the engineman. It appears that on the Wabash Railroad the enginemen on passenger trains are expected to give a steam whistle signal on approaching a meeting point, and the conductor must be prepared to stop the train if he does not hear it. It would seem as though it would be preferable for the conductor to signal the engineer and receive his response, for this signal is sure to be heard by the engineman, or there is no reply from him. In that case the signal from the conductor can be repeated, while the conductor might not hear the whistle of the locomotive. In either case, it would seem that the engineman and conductor should signal one another so that they might know that they were understood.

This additional safeguard might easily be adopted by the companies without expense and would apparently prove to be of great advantage, particularly on passenger trains, as it would of necessity require not only the engineman, but the conductor as well, to be constantly alive to the importance of remembering all orders particularly with reference to meeting points.

It has also been suggested that when two or more meeting points are made in one order, some distinctive form of order should be adopted for the purpose of impressing those to whom it is addressed with the fact that it is a complex order.

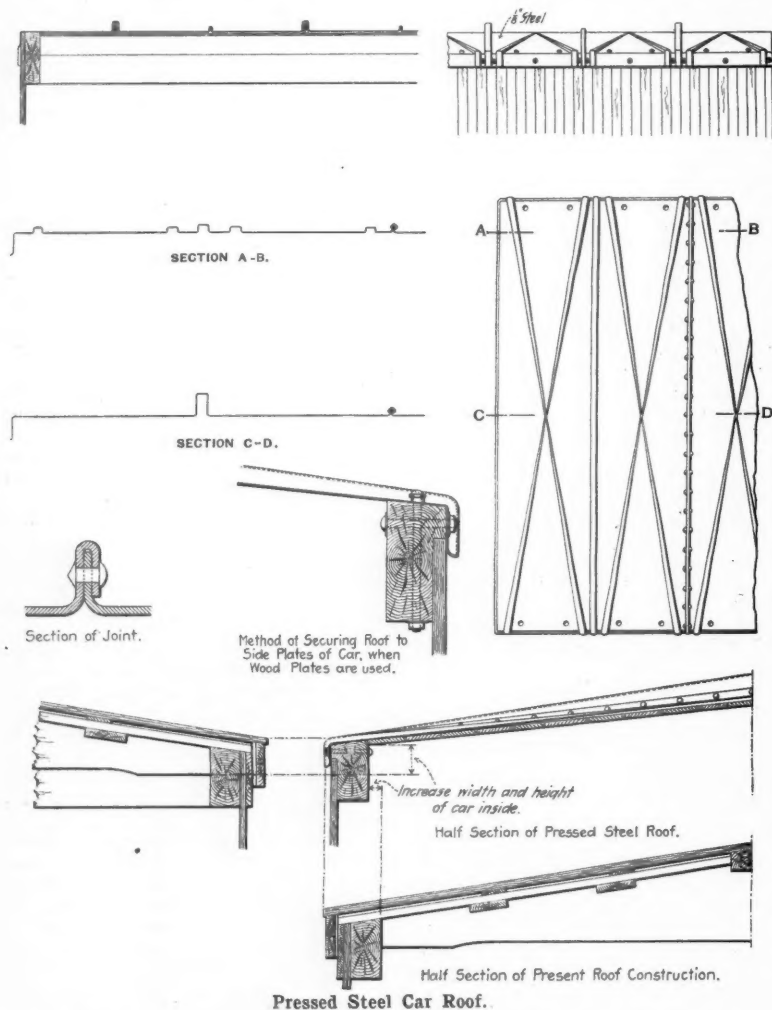
It has also been suggested that the fireman receive a copy of each train order as well as the engineman. It is true that his duties are already numerous, but it would seem that to make himself familiar with all train orders should be one of his first and last lessons. This would better fit him to fill the more responsible position of engineer when his time comes for promotion. While he is receiving this education, this plan would serve as an additional check on the engineer and would seem to add an additional safeguard for the prevention of accidents. It might also be well to require the engineer, after receiving an order, to post the same in a conspicuous place in his cab until the same has been complied with.

It therefore seems advisable that until such time as all railroads in the State shall be provided with double track, or with some first class system of block signaling, that the standard code of rules be given careful attention for the purpose of making all possible improvements in the same, for the prevention of accidents.

Kindly give this matter your attention and advise me as to your opinion of the advisability of taking up the code of train rules for the purpose of amending, and, if possible improving, the same. Would also be pleased to receive any suggestions from yourself or the person in charge of your operating department with references to any changes that may be suggested by your experience and expert knowledge, and to be favored with your views regarding the idea of calling a meeting of the operating railroad men for the purpose of having a personal discussion of the question to the end that the code of train rules be made as perfect as possible, and the danger of accident reduced to a minimum.

A Pressed Steel Car Roof.

In our issues of Sept. 27 and Nov. 22, the pressed steel carline designed by Mr. B. Haskell, Superintendent of Motive Power of the Pere Marquette, was illustrated. It was shown that with given inside dimensions of box cars the height of the car at the eaves is reduced 2 in. by



Pressed Steel Car Roof.

using carlines of pressed steel. Now Mr. G. B. Maltby, draftsman in Mr. Haskell's office, with a similar object in view, has designed and patented a pressed steel car roof which eliminates the carlines. The construction is shown by the accompanying engraving.

The roof consists of sections of $\frac{1}{4}$ -in. steel the width of the car and pressed so as to give the required stiffness. The form of the overlapping joint between adjacent sheets is shown in detail, as is also the method of fastening the roof to the wooden side plates. At the middle of each section the sheet is pressed into an inverted U which projects above the roof surface and takes the place of the ordinary carline. A wooden strip is fitted into this projection from below to which the ceiling is nailed. As

this projecting ridge gradually increases in depth from the eaves to the middle of the car the diagonal projections are made to decrease in depth toward the middle, so that each section of roof can be made from a rectangular plate. The steel plates are turned down at the eaves so as to cover the siding and take the place of the facial boards.

The drawings show a comparison between the pressed steel roof and the ordinary construction. It is apparent that with given inside dimensions, the outside dimensions of the cross-section are less with the pressed steel roof. Or, with given outside dimensions, the pressed steel roof permits of a considerable increase over the usual width and height inside.

Recent Locomotive Construction and Performance.

We printed a short time ago (page 817) a short abstract of Mr. Cole's New York Railroad Club paper with the above title. In discussing this paper Mr. Vaulain said:

In the paper which has been presented to you this evening, I would like to call your attention to the fact that four items are mentioned; first, the general introduction of the wide fire-box for burning bituminous coal, which is supposed to have taken place within the last two or three years. If you will remember, some two or three years ago, I had the pleasure of addressing you upon this most important subject, the advisability of using wide fire-boxes on locomotives, especially for the consumption of bituminous coal, as in that direction more than in any other railroad managers could expect to effect a very great saving in the expense of operation of their locomotives, and at the same time reduce the amount of labor that would be required from the firemen.

The second item is the use of flues of largely increased length. It is true that in late years the use of long flues has come into almost general practice, but long flues have been used for a number of years, and not only within the last two years or three years.

Third, is mentioned the improvements in the design of piston valves and their introduction into general use; fortunately, Mr. Cole has stated that the design and use of piston valves has enabled the designer of to-day to use high-pressure steam in a satisfactory manner; but from some locomotives, which I will show you later on, it will

be noticed that it is not at all necessary to use a piston valve on a simple engine for the proper use of high-pressure steam, as on 95 per cent. of all the simple engines that we build to-day, engines carrying 200 and 220 lbs. of steam, we still use the slide valve.

Fourth, we note the recent progress made in the use of tandem compound cylinders. That is very encouraging. Tandem compound cylinders, as you are all aware, are possibly the earliest type of compound cylinders about which we know, and it is very comforting to know that the tandem compound engine is at last finding favor or is coming into use. There is plenty of room for them all.

In glancing further over the paper, my attention is attracted to the method employed on what is known as the Atlantic type locomotives for increasing their tractive effort. I do not know whether you know it, but the originator, I might say, of the Atlantic type of locomotive, is among you to-night, and for your information I will say it is Mr. J. N. Barr, formerly of the Chicago, Milwaukee & St. Paul Railroad, who first suggested to the speaker the advisability of building passenger locomotives for high speed with two pairs of drivers coupled, and a pair of trailing wheels placed under the

fire-box, so that larger grate area could be provided and a deeper box. The progress of the Atlantic type engine since that time has been very gratifying indeed, and it affords me great pleasure to-night to say that not only has almost every locomotive builder in the country produced an Atlantic type engine within late years, and recognized their merit, but we have sent locomotives abroad, not only to France but to Belgium and to Japan, of this type; we have also, by the marvelous performance of these locomotives in the United States, compelled Great Britain and France to adopt this particular type in many of their recent locomotives.

The traction increasing device which is mentioned in this report, is not new. It is precisely the same device

which was adopted by Mr. William P. Henzey, of the Baltimore Locomotive Works, and applied to a single driver locomotive which operated between New York and Philadelphia for quite a long while before it was sold to the Eames Vacuum Brake Company and went to pieces in England.

The designs presented in the paper are excellent and reflect great credit upon the engineers who have brought them forth. But I add that the designs presented are not sufficient in number or striking enough in example to afford you a proper idea of what the general practice among railroad companies in the United States to-day is. I have therefore taken the liberty to bring along with me a few photographs which I will take pleasure in showing you on the screen so that you can get a better idea of them, and I will try to explain them to you, their sizes and also their advantages from my point of view.

Mr. Vaulain showed many recent locomotives by lantern slides. These have been so generally and so well described in the *Railroad Gazette* that it is hardly practicable to reproduce any of the engravings now; but the pamphlet report, which contains Mr. Cole's paper, and Mr. Vaulain's description, is an excellent document to file for reference.

Mr. Vaulain first showed an Atlantic type engine, built for the B. & O., to haul nine heavy cars on a fast schedule. This was required to come within a total weight of 150,000 lbs., with 44,000 lbs. on the driving wheels. This type has been taken up for fast service on many lines and Mr. Vaulain says that the finest specimens of the Atlantic type engine are now in use on the Pennsylvania Railroad, these carrying 109,000 lbs. on the driving wheels.

He next showed the Prairie type which originated on the Chicago, Burlington & Quincy, 50 of which the Baldwin Works have built for the C. B. & Q., and they have now on order 50 more, all being compounds.

The next engine shown was the very heavy passenger engine for the Atchison, Topeka & Santa Fe. These locomotives are enormous. They have high-pressure cylinders 17 in. in diam., and low-pressure cylinders 28 in. in diam., 28-in. stroke, 79-in. wheel, carrying 149,000 lbs. on driving wheels, or a total of 205,000 lbs. The boilers have quite 4,000 ft. of heating surface in them, and in every way are what we might say an up-to-date passenger locomotive. I believe there is nothing larger in the passenger line to-day. We have constructed 40 of these locomotives for the Santa Fe railroad, and we have 45 additional on order.

"Following the wake of the trailing wheel, we come to the next monstrosity, I might say, but it is not a monstrosity—it is what we are all coming to sooner or later. This locomotive is designed to burn lignite fuel, fuel that is much lighter than wood, which is a free-burning material; but in order to get the desired result in the shape of sufficient steam to operate your locomotive, it is necessary to burn a great deal of it. Therefore, you will notice that the fire-box is very wide and it was necessary that the furnace be very deep, because a deep fire must be carried at all times, similar to a wood fire. The locomotive is giving most excellent results, and is the forerunner of its type in this country. But it is not new. It is simply the adaptation of a type of locomotive, of which we have built a very great many for foreign countries, to the service and conditions that are presented to us at this time in this country."

Another engine shown was "an example of the 10-wheel passenger engine of the present time. This locomotive is one of more than 50 that we have constructed for the Union Pacific Railroad. The cylinders are 15½ in., high pressure, 26 in. low pressure and 28-in. stroke, with 79-in. wheels. The wheels are not the same under all of the engines, but the engine itself is the same, the diameter of the wheel being regulated to suit the grades of the various divisions over which these engines operate. We have on order at the present time 10 additional locomotives of this type. They carry 142,000 lbs. on their drivers, and weigh about 185,000 lbs. total."

"Another was one of a number built under special guarantee for the Lehigh Valley Railroad to haul their heavy through passenger trains on their mountain division. The cylinders are: high pressure 17 in., low pressure 28 in., with 26-in. stroke and 72-in. driving wheel.

"The locomotive in Fig. 27 is an improvement on the 10-wheel locomotives used by the Chicago, Milwaukee & St. Paul Railroad for several years. This locomotive was originally schemed out by Mr. J. N. Barr, and carries 135,000 lbs. on the driving wheels, with cylinders 15 in. high pressure, 25 in. low pressure and 30-in. stroke. This order of 34 were equipped with a wide fire-box, and are said to be giving even better results than the more than 60 locomotives of the same type that we have built with the 42-in. wide fire-box. We have an additional order on hand at the present time for 35 more of these locomotives for this service, and quite recently we have received four engines identical with this an order for 50 from the Northern Pacific Railroad, which will soon appear on the scene.

"You have, in Fig. 29, a representative locomotive, not only from the standpoint of design, but because it is in use on one of the most important systems of the United States—the Pennsylvania. It is simply their standard freight Mogul re-designed and brought up to a modern point of view. The fire-box is of the wide type with a sloping throat-sheet. The cylinders are 21 x 30, with a 62-in. wheel, and the weight on the drivers is about 142,000 lbs. We have constructed for the Pennsylvania Railroad more than 50 of these Moguls with the narrow

fire-box, 42 in. wide, and at the present time are finishing an order of 30 with the wide fire-box. In addition to the order that we are now finishing for the wide fire-box, we have 50 additional on order for completion in the early part of 1902.

"We now have come to the Mogul locomotive. The locomotive which you see [another slide] is the Vanderbilt boiler locomotive. These locomotives were built for the Southern Pacific for burning petroleum, and I consider that they are to-day the most satisfactory oil-burning device with which I have met. These locomotives carry about 135,000 lbs. on their drivers, or 45,000 lbs. per axle, with about 22,000 lbs. on truck.

"I take pleasure in showing you a sister engine to the Vanderbilt engine, built for the Southern Pacific Railway, and this is one of 45 which we are finishing. This locomotive carries about 130,000 lbs. on driving wheels, with a total weight of about 150,000 lbs. It is not quite so heavy as the Vanderbilt boiler, because we had leeway on the Vanderbilt, and we made it as large as we possibly could in order to avoid such a high temperature in the fire-box, or, in other words, so that we could burn the oil more moderately and still generate sufficient steam with which to operate the locomotive. We have on hand at the present time an additional order from the Southern Pacific for 80 of these locomotives, some of which will be this type of locomotive.

"The engine shown in Fig. 33 is a passenger locomotive. It may be quite novel to you to think such a locomotive [a consolidation] is a passenger locomotive, but it is nevertheless true. The service that these locomotives are called upon to perform is excessive. The grades are 3 and 4 per cent. and of great length. The ruling curves on the road are 16 deg. The drivers are all flanged. The high pressure cylinder is 17 in. in diam., and the low pressure 28 in., with a 26-in. stroke and a 60-in. driving wheel. These engines have given most excellent service for passenger work, and have exceeded the most sanguine expectations of the general manager, Mr. Charles Schlacks. The engines are also provided with a pneumatic water brake, a recent device which we have brought out, and with which we are equipping almost all of the locomotives which operate in the extreme Western country, or in the Rocky Mountain region. The engine is operated on a down grade, with the driver brake cut out entirely, the reverse lever in full back motion and the amount of air which is pumped up by the cylinders running in reverse motion is regulated by a valve at the hand of the engineer in such a manner that the speed of the train is controlled entirely by the air which is pumped up by the locomotive itself. It is surprising how uniformly one can bring a passenger train down those long grades without applying any brakes to the car wheels at all. The serious business of running passenger trains or freight trains also, I might say, on long, steep gradients is that the tires warm up, the brake-shoes get redhot, and cast-iron wheels sometimes burst, making the wear and tear on the wheel equipment very hard. But with this device and this locomotive we were able to bring train after train down those grades without any assistance from a brake at all. In some few instances it was necessary to make a light application of air, but I do not think it was due entirely to the lack of efficiency of the braking device on the locomotive, but to the timidity of the engineer. He had not been accustomed to come down grade in that style before, and therefore was naturally a little afraid.

"The locomotive that you see in Fig. 34 is one of 21 locomotives for the El Paso & Rock Island Road. These engines are doing magnificent work and are in a region where it is very difficult to get anybody to look after them. Therefore it is wonderful that locomotives of this immense weight—they carry 160,000 lbs. on their drivers, or 180,000 lbs. total—are so easily maintained and kept in order.

"The engine shown in Fig. 35 is one of a number built for the Rio Grande Western Road, with the grades of which you are no doubt familiar. Quite recently on the Rio Grande Road, the Rio Grande wishing to order some locomotives, a competitive test was ordered between this locomotive, a sister locomotive carrying cross-compound cylinders, and a simple locomotive. The result which we would naturally expect was obtained, and we have the order from the Rio Grande Road for 40 four-cylinder, compound locomotives, to be delivered in the early spring. The engine carries 177,000 lbs. on driving wheels, and about 197,000 lbs. total. The cylinders are 17 and 28 in. in diam., by 30-in. stroke, with a 57-in. driving wheel. The boiler has an enormous amount of heating surface and is fully capable of taking care of itself under the most adverse conditions.

In Fig. 36 you have before you what heretofore has been the standard heavy freight locomotive of the Pennsylvania Road. This locomotive has a total weight of 174,000 lbs., with a weight of 156,000 lbs. on drivers. You will recognize that that is not up to the limit. The standard load per axle to-day on nine-tenths of the railroads that are railroads in this country is 45,000 lbs. per axle, and all locomotive designs that we come in contact with are being worked out upon that basis; consolidation locomotives with 180,000 lbs. on drivers, Moguls to 135,000 lbs. on drivers, four-wheel connected locomotives for passenger service 90,000 lbs. on drivers, and when we build single-driver engines we do not like to tell you how much we put on one pair of drivers. We have already built for this company a very large number of these locomotives. At the present time we are busily engaged turning out an order of 56 of this same locomotive, remodeled

with a 66-in. wide fire-box, in order to give it more grate surface. It was found when the engines were put down to the work they were supposed to perform, that the grate area was not sufficient, that the firemen would be worn out and the fire get worn out, too, in ascending some of the heavy grades found on their road; also, where the service was long and continuous where the grades were not heavy, but the trains were fully up to the capacity of the locomotive, it was almost impossible for the fireman to endure the excessive service he was called on to perform. As the locomotives that were altered for trial early in the spring—with wide fire-boxes—proved so satisfactory, the Pennsylvania Railroad has changed its standard design to locomotives exactly as those locomotives were changed to, with the exception of a few minor details which they saw fit to modify.

"In addition to the 56 locomotives that we are now building of this kind and delivering, it may be interesting to you to know, as evidence that the heavy locomotive has come to stay, that we have an order at the present time from the Pennsylvania Railroad system for more than 300 of this kind of locomotive to be delivered in the early part of 1902.

"You have, in Fig. 38, a Vanderbilt locomotive which carries 175,000 lbs. on drivers, or a total of 196,000 lbs. The idea in building this locomotive was to test the efficiency of this boiler in bad water districts, especially in that district in which Rawlins is found. The locomotives have been there long enough to have been called in for slight repairs, and an examination of the interior of the boilers shows them to be in first-class condition. At this early date in our experience with the Vanderbilt boiler it is impossible to state just how satisfactory this locomotive will be. But it is apparent that it is impossible to get a wide grate on this locomotive. It may not, and probably will not, come into general use on that account. But every locomotive does not need a wide grate. We must not get away from that fact; it has been found in actual service on some roads that these locomotives are not in some instances so hard on fuel as some of their sisters—in one instance as some of their sisters having wide fire-boxes; it is difficult for me to determine why this should be, but such is the case, and it is probably due to the fact that in the wide fire-box mentioned there is not sufficient volume above the fire to afford proper combustion for the gases, whereas in this fire-box, being so long, with a very long combustion chamber, even with a moderately wide grate—it is not what we might call a narrow grate, being some 54 in. wide—there is sufficient room, sufficient volume in that chamber called the fire-box, for the proper combustion of the gases before they pass through the tubes.

"The last, but not the least, of the locomotives which I take the liberty to show you this evening is a freight locomotive built for the Soo Line. You will notice it has five pairs of drivers connected. This is not the first decapod that we have built, but it is one of a very few that we have built, not more than a dozen all told. It serves to show the trend of thought at the present time. The railroad manager is anxious to do just a little more, and in this case he does 25 per cent. more. That is, he is capable of hauling, if his road will stand it and the engine can be operated successfully by the ordinary train crew, he has a hauling capacity about 25 per cent., in round figures, over what he has in the consolidation locomotive carrying the same load per axle. This engine has been in service quite a while, and as the outgrowth of its endeavors to earn dividends for its owners, we have to-day on order no less than 74 decapod locomotives similar in type but very much in excess of the weight of this locomotive. We had a limit on this engine of a weight of 190,000 lbs. on drivers, or a total weight of 215,000 lbs. The decapods that we now have on order, and which will be turned out of the shops in the early part of the coming year, are engines with 57-in. driving wheels, high pressure cylinders 19 in. in diam., low pressure cylinders 32 in. in diam., 32-in. stroke, carrying 230,000 lbs. on drivers, 260,000 lbs. total weight. On the oil burners they have about 5,800 ft. heating surface, and on the coal burners about 5,200 ft. From these figures some conception can be had as to what extent the modern locomotive is growing in size."

DISCUSSION.

Mr. R. P. C. Sanderson.—With reference to some points brought forward by Mr. Cole in his paper I would like to call attention to some things which have occurred to me in reading it with a view to bringing out discussion. A horizontal seam is shown on the inside of the fire-box about half way between fire and crown sheet; such a seam is very objectionable, especially in bad-water countries, and I would like to know why it was used, when sheets can, I believe, be obtained without difficulty large enough to make both sides and crown sheet in one piece.

Assuming Mr. Cole's position to be right, which it unquestionably is, that every pound of weight should be thrown into effective boiler capacity that it is possible to get within the limits of weight, can and should not such increased capacity be obtained with equal weight by reducing the diameter of the boiler to the front, drawing the flues together a little in the front flue sheet and tapering the outside and inside fire-box from the waist joint backwards, throwing the weight thus saved into the increased diameter (and greater number of flues) at the center sheet? Of course, that would make a little more difficult the fitting up of the boiler, but with modern methods and shop practice the increased cost is not serious.

There is one point in connection with the economical use of coal with the wide fire-box engine which must not be lost sight of, or disappointment will be the result; it applies more particularly to engines burning soft coal and is of more importance with free-burning coals of good quality than with inferior slow-burning coals. The engines will burn coal at a greater rate when standing still, and it is impossible to prevent a great deal of loss while the engines are on the sidings.

Referring to the piston valves, it has been my good fortune to have quite an extended experience with piston valves, in both east and west, and results obtained therefrom have been most favorable. In fact, I do not believe that any modern engine should be built with any other sort of valve.

With regard to the four-cylinder compound engine, I think that there are possibilities in this line which will lead to extended use of this pattern of engine when the detail designs have been thoroughly tested by long service. Some experience which I have had in the west with four-cylinder compounds indicates that the matter of detail design is of the utmost consequence if the engines are to make maximum mileage and stay out of the roundhouse and shops, and if the running repairs are to be made quickly and cheaply. In the case of one four-cylinder compound engine hauling a passenger train, that came under my notice, the engineer brought it in and reported valves out of square; examination of the engine showed valves to be in perfect setting, but when the cylinder head was removed it was found that the entire low pressure piston was missing, or rather was lying in small lumps on the bottom of the cylinder, and the engine had evidently been running for some time in this condition.

Mr. F. F. Gaines.—On the fifth page of the paper it is said: "Before the heavy locomotive of the last seven years came into general use, the possibilities of obtaining large grate area for ordinary bituminous coal seemed exhausted without resorting to the Wootten type." I would like to know just exactly what is referred to by the Wootten type. As I understand the Wootten type of boiler, it is a wide fire-box boiler essentially containing a combustion chamber, with a brick wall, a grate composed largely of water bars. If that is the fact, we do not have to go to the Wootten boiler, and it was not done in that time. I have got records where engines have been built with practically the boilers described in the paper before the Club, having grates about 72 in. wide, as long ago as 1887. It was common practice at that time, and that is only 6 in. wider than the engine that is illustrated here. So I think that that refutes the proposition that it was impossible to build a grate of that width at that time. It makes no difference whether it is for soft coal or hard coal. The grate width was there.

Mr. Cole.—It may be interesting to know that it is possible to construct a piston valve with a clearance of only 5 per cent. We have a large number of engines running on the Chicago & North Western in which the clearance limits were reduced to about 5 per cent. We find it perfectly practical to make the cylinders with 8 per cent. clearance, giving ample passages and port openings for the piston valves, and this figure seems to represent what is generally accepted as the best practice, either in slide valves or in piston valves for simple engines.

In regard to the Wootten type of boiler that Mr. Gaines mentioned, the term "Wootten type" was intended in the paper to include perhaps not only the generally accepted form, but a form of box about 8 ft. in width, with or without the combustion chamber which was generally used for many years to burn anthracite coal. Of course, it was necessarily a very shallow box, and while it was fitted in some instances for burning slack bituminous coal, yet it had not come into general use for burning the ordinary "run-of-mine" bituminous coal. Its use was confined principally to anthracite coal and the finer grades of bituminous coal. So that is the meaning I intended to convey as to the Wootten type of boiler. I do not in the paper speak of the impossibility of the construction of the boiler, but merely say "the possibility of obtaining"; it was intended to mean a deep fire-box as opposed to a very shallow one.

Mr. Vauclain.—I believe I understood Mr. Cole to say that wide fire-boxes have not been heretofore constructed for the purpose of burning "run-of-mine" bituminous coal. Before proceeding to refute that statement, I wish to say to the president and the members that all the credit for the present wide fire-box on our locomotives, if there is any credit to be given, must be given to Mr. Levi Paxson, Mr. Alexander Mitchell and others who, some 20 or 25 years ago, commenced to work on this proposition; all of the wide fire-boxes that were sold out of the anthracite region up until the present modified form of Wootten fire-box or wide fire-box has come into play for the consumption of the best fuels that are used, as well as "run-of-mine" coal, were constructed for the consumption of "run-of-mine" bituminous coal, or, worse than that, for the screenings from the bituminous mines, and we have constructed in former years great numbers of wide fire-box locomotives for just that work. The reason why the wide fire-box for bituminous coal was not as successful as it should have been, was not because it did not give satisfaction as a steam producer, but because the engineer and the fireman were separated by the box, and it had not then been considered satisfactory to reduce those surfaces. As some speaker has remarked this evening, "having a good thing, they thought that the more they could get of it the better they would be off." As a result, it has only been in the last six or seven years that we have been reducing the width of the fire-boxes so that the cab

could be placed giving the engineer and the fireman close connection with each other.

The ratio of heating to grate surface for lignite coal depends somewhat on the analysis of the lignite itself. For the more inferior grades of lignite coal we like to have a ratio of not over 50 to 1, and preferably 40 to 1. Forty to 1 is a very desirable ratio of heating to grate surface for anthracite coal; but anthracite coal is entirely the opposite from lignite. Lignite is a free-burning fuel, very light and full of water, similar to green wood, and therefore, in addition to the excessive grate surface, it is necessary to provide excessive depth of furnace. For good bituminous coal, to get the very best results, we demonstrated several years ago, I think in 1892, or 1893, that the desired ratio of heating to grate surface was about 60 to 1, and in all the satisfactory locomotives for bituminous coals that we build, the ratio of heating to grate surface is about that figure, unless it is found that in order to increase the weight of the locomotive we can increase the size of the boiler and get a much larger heating surface than is actually necessary for a locomotive of that sort, in which event the heating surface is allowed to run as high as 70 to 1. The "run-of-mine" coal is always harder to burn than the better class of coal, and for that purpose, when we know of locomotives that are to use that class of fuel, we do not like to exceed a ratio of 1 to 60; whereas with the higher grade of bituminous 1 to 75 is quite permissible. For soft coal screenings or slack at the mines, we find that it is necessary to provide about all the grate we can get. That becomes a case of getting the most of a good thing that we can.

Mr. J. N. Barr.—I would like to ask whether our locomotive builders cannot build a boiler to-day, and provide staybolts for 200 lbs. pressure, that will do as well as the old staybolts for 150 or 160 lbs. The fact of the matter is, I do not believe that the locomotive people feel enough the influence of the motive power people. We look at an engine that will haul 40, 50, 80 cars on certain grades. That settles it. It is turned out and then the trouble of the motive power people commences. It does seem to me in that respect that the locomotive builders are not attending to their duties, and I think that we, as

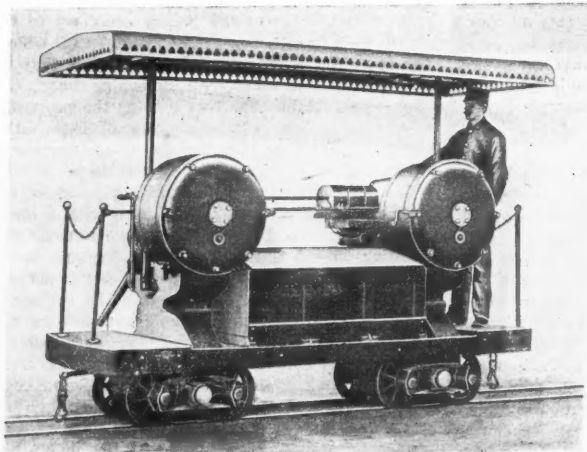


Fig. 1.—Hunt Electric Shop Locomotive with a Canopy.

motive power people, ought to hold them responsible. If they will lie down and say that they cannot fix staybolts for 200 lbs. pressure that will do as well as 125, why, I don't know but what we ought to try to help them along a little.

Then there are a good many other items in just exactly the same line. We are replacing brasses. Here is an engine that should be earning \$50, \$75, \$100 a day, in the shops 48 to 50 hours. We had cracked frame. Cracked frames—I think that the majority of you will join me most heartily in saying that cracked frames are a tremendous nuisance and expense, and I cannot understand why the locomotive builders cannot fix a frame of an engine that will do just as well as the old engines carrying 160 lbs.

Mr. E. E. Davis.—We have some 25 of the Atlantic type engines with the wide fire-box on the New York Central Road and have had them in service for about eight or nine months, and so far they have given us very good results. The Atlantic type engine was under my charge seven or eight years ago, while I was connected with the Philadelphia & Reading Railroad. A few new-fangled ideas have been added to some of the Atlantic type engines with the wide fire-box during the past two years, and I do not know that we are doing so much better now than what some of the Atlantic type engines did some years ago, although I think that the wide fire-box is all right for soft coal. In fact, it is all right for any class of coal that is mined in this section of the country.

Mr. Cole.—The discussion has been very interesting and instructive. It shows the extended use of wide fire-box locomotives. The paper necessarily illustrated largely the production of the American Locomotive Company. It is not claimed, of course, that the improvements are all entirely new and novel, but they merely show some of the changes which have come into very general use. The discussion also confirms one of the statements made in the commencement of the paper of the extended changes

and departures made in the standard types of a few years ago.

Regarding what Mr. Vaulain said about the use of bituminous coal in wide fire-box engines, I wish to say that some 16 years ago on the Baltimore & Ohio, we had two Wootten locomotives that were built from the general plans of the Reading Road, similar to those they used for burning anthracite coal, but they were used exclusively on the Baltimore & Ohio for burning "run-of-mine" bituminous coal. These engines had about 64 ft. of grate area, and as the engines weighed, I think, 102,000 lbs., their heating surfaces were probably not over 1,500 or 1,600 ft. It was then found necessary to brick up at least a third of the grate area in order to burn the soft coal more economically. That would still leave the grate very large, even when viewed in the light of our present knowledge.

Regarding the flues that Mr. Bartlett speaks about in his letter, we have followed closely the service of these long 16-ft. flues and have heard very few complaints about their leakage on other roads. I know Mr. Bartlett has had some little trouble, and it is hard to tell exactly the cause, but in a general way we can state very positively that the flues of increased length are giving excellent satisfaction, and I believe those of 18 ft. 6 in. on the Lake Shore are giving good service.

Electric Locomotives for Shops.

In most of the railroad shops and other large industrial establishments, the transportation of material from one part of the works to another is a matter of serious importance. Unless suitable means is provided to supply raw material to the mechanics when needed, and to remove the product a considerable loss in time and labor of the men and in the idleness of the machine tools will result. One of the best methods of preventing this loss is by industrial railroad tracks and cars through the shops and yards.

The C. W. Hunt Company have made for many years a system of such tracks, with cars of various types to suit the material to be handled. Complete systems of these industrial railroads have been installed in many large shops in this country and abroad. The Hunt

motor armatures and fields in various series-parallel combinations, thus obtaining the different variations of draw-bar pull and speed required for the general shop work. Unusually large and heavy battery plates are used, which are not over-worked even in starting the load, thus insuring a durability and efficiency of the lead plates equal to that found in batteries used in electric lighting station work.

Two independent electric motors are used, either in series or in multiple, which at low speeds give a great starting effort with a minimum consumption of electric current, an object especially desirable with storage batteries, as they can be charged with only a limited amount

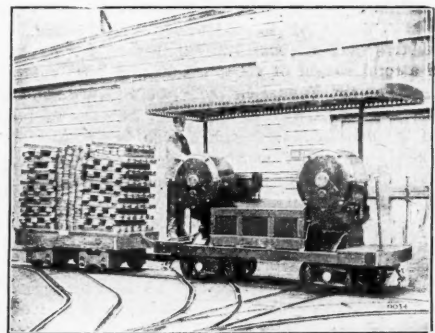


Fig. 2.—A Five-ton Load on a Five Per Cent. Grade.

of energy. It is evident that any increase in the efficiency of either the motors or the mechanism is equivalent to increasing the life of the batteries and the radius of action of the locomotive. The difference of level in the floors of workshops is a source of expense, when articles are removed by hand. This disadvantage disappears, however, with the storage battery locomotive, as it hauls its load up all grades encountered in reaching any part of the works.

The motors are not mounted between the wheels, because the space is extremely small, and also for the reason that this method of mounting would bring the motors

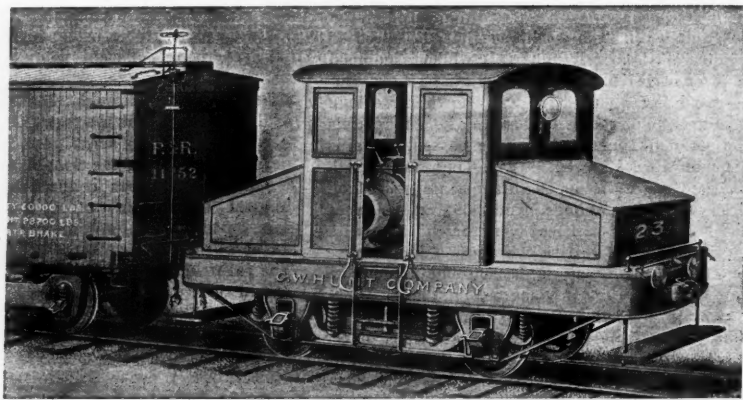


Fig. 3.—Hunt Storage Battery Switching Locomotive.

Company a little time ago decided upon a storage battery electric locomotive for the motor power for hauling the cars and the success of these locomotives (See Fig. 1) has been such that these machines are now regarded by many as a necessary element of the installation. Of course, these locomotives are not intended for heavy or continuous service, or for use on severe grades, but, in the services for which they were designed, they possess many advantages over steam or trolley locomotives. One of the most important of these advantages is their suitability for use wherever the fire risk is an important consideration.

The use of steam locomotives in buildings is often prohibited on account of the danger of the sparks. Electric locomotives operated by trolley are also dangerous, on account of the sparking at the contacts, both at trolley and tracks. This is particularly true where there are many switches, crossovers or curves. None of these objections apply, however, to these electric locomotives, operated by storage battery.

The standard gage for these locomotives is 21½ in., corresponding to the gage of the Hunt Company's standard industrial railroad tracks. With the use of this narrow gage, it is possible to reach any part of the works and the locomotive runs with freedom around curves of 12 ft. radius. The entire machine is carried on two swiveling eight-wheel trucks, with every wheel a driver, thus enabling the locomotive to ascend moderate grades with ease. (See Fig. 2.)

The energy is furnished by a storage battery, recharged at night, or at intervals during the day. In many situations the locomotive will have various intermissions in its work during the day that can be utilized for charging and the batteries can be kept fully charged without charging at night. The daily recharging of the batteries requires about one-quarter as much time as the locomotive has been in active work during the day.

The battery on the locomotive is divided into sections, which are connected through the controller with the

and gears so close to the track that the machinery could not be protected from dust or mud. All the gears, shafts, and bearings are enclosed in an oil-tight circular case which excludes rain and dust, and keeps the bearings in alignment, and permits the gear wheels to run in a bath of lubricating oil.

In almost every case, the first cost of the battery for supplying the energy to the locomotive is less than the cost of trolley wires. The battery locomotive can instantly run on any track, regular or improvised, while trolley locomotives can run only where wires are installed. Trolley wires can not be installed in many cases, such as erecting shops or under overhead cranes, while the battery locomotive is efficient wherever a track is laid.

In addition to the standard shop locomotives the Hunt Company also make electric switching locomotives, for use on standard 4 ft. 8½-in. track. These are built in accordance with the Master Car Builders' standards and are arranged with two motors, so that every wheel is a driver, thus making the whole weight available for traction. These locomotives possess the same advantageous features as the small shop locomotives, already described. They are always ready for use, and, when the work is finished, the attendant can leave the machine at once, and there is no expense whatever when the machine is not in use. One of the switching locomotives is shown in Fig. 3. They are built of various capacities and are modified, when necessary, to suit particular services in yard work.

Government Regulation of Working Hours in England.

The British Board of Trade has issued its eighth annual report of its doings under the law of 1893 requiring the Board to receive and consider complaints from railroad employees of excessive working hours. The number of complaints considered in the year ending July 27 was 19, which is less than half the number in 1900. The num-

ber has gradually decreased from 156 in 1895. Secretary Hopwood says:

It will be observed that fewer complaints have been made to the Department during the time under review than during any similar period since the passing of the act. I hope that the falling off in the number of representations is an indication that the act has, to a great extent, done the work for which it was placed upon the statute book. It must always be borne in mind that the aim of the act was not to give railroad servants anything in the nature of a fixed-hours day, but to put a stop to such excessively long hours of labor as were not only bad for the railroad man, but also a source of danger to the traveling public. There is no doubt that the evil existed formerly; it is also certain that if it still exists the statute provides a reasonable remedy for its abatement. But the complaints of to-day do not bear evidence of excessive hours of work in the larger sense; they are rather made with the object (very often reasonable) of obtaining a reduction of a booked day's work from 12 hours to 10 hours, or 10 hours to eight. It is obvious that demands of this description must be considered on their merits, and that due regard must be had to the nature and amount of work which each complainant has to do during his spell of duty. The Board of Trade have consistently considered all such representations on their merits, though they have steadfastly set their faces against a 12-hour booked day in all cases, except those of signalmen on branch lines, where traffic is light, and of certain other classes where the nature of the employment of the men allows of sufficient intervals of rest and adequate time for meals. The railroad companies are fully alive to the views of the department in this respect, and the falling off in the number of complaints is doubtless accounted for in great measure by the fact that the companies have themselves largely reduced the hours of their servants in order to bring the booked hours into harmony with the views of the Department, as set forth in the course of correspondence upon specific cases.

The observations which I have made have reference to the booked hours of railroad servants. I now desire to say a word upon the actual hours worked by many of them. While there is no doubt that a general reduction in the booked hours of railroad servants has made steady progress in recent years, there has not always been a corresponding reduction in the actual hours worked. The latter should, of course, be kept as far as possible in line with the booked hours, and the Board of Trade have consistently pressed this point upon the managers of railroads. It must, however, be admitted that the exigencies of railroad service and the fluctuations of traffic make it difficult to insure anything like uniformity between the booked and the actual hours of work.

The Department is always ready to inquire with promptitude into complaints that the hours habitually worked exceed the booked times of duty, and their experience leads them to believe that railroad managers will give their best attention to well-founded representations which go to show that the traffic at particular places is habitually of such volume that the existing staff cannot reasonably be expected to handle it properly within the appointed time for duty.

The New Dry Dock at Baltimore.

The Wm. Skinner & Sons Ship Building & Dry Dock Company, of Baltimore City, opened their new dry dock Nov. 25, 1901. This dock is capable of docking any vessel 600 ft. long and 70-ft. beam, with a draft of 22½ ft. The basin is of timber, supported on piling, and the entrance is of granite masonry backed with Portland cement concrete. The gate is a steel caisson, giving an opening of 75 ft. 8 in. at the low water line with a depth of water on sill of 22½ ft. The dock will be filled through six 36-in. valves in the caisson, and emptied by three 36-in. centrifugal pumps. The latter have a capacity of 105,000 gals. a minute when all three are in operation, and will empty the dock in 1½ hours. To care for the leakage a 14-in. centrifugal pump has been provided. The boiler plant consists of three 350-h.p. water tube boilers, which will furnish steam for the engines of the main pumps, and one auxiliary tubular boiler for the supply of the drainage and caisson pumps and the draft fan, also for the pumps furnishing water for washing out the dock and for fire protection.

The principal dimensions of the dock are as follows:

Length over all.....	628 ft.
Width on floor.....	62 ft.
Width at top of keel blocks.....	69 ft.
Width at top of dock.....	125 ft.
Entrance at bottom.....	60 ft.
Entrance at top.....	80 ft.
Depth of water on sill at low water.....	22½ ft.
Depth of water on sill at high water.....	25 ft.

The principal difficulties encountered were in the masonry and concrete work at the entrance, where the excavation was made to a depth of 36 ft. below low water. The excavation was 44 ft. wide and 164 ft. long, and was 208 ft. from the present shore line in the harbor. The foundation soil is hard, white clay, and into this there was run a cut off wall, 3 ft. wide and the same depth, extending across the entrance and abutments, to prevent the leakage of water between the concrete and the clay, which might occur by reason of the formation of a seam at that point.

The floor of the engine room is 10 ft. above the bottom of the dock, and 22½ ft. below the top. The walls of the engine room are of concrete from 11 to 16 ft. in thickness, and in the walls and floor there is a cut off of cement mortar, 3 in. thick. A syphon is provided to take care of

any seepage of water into the engine room. The boilers are supported on a foundation of concrete, 7 ft. in thickness, which rests upon a timber grillage supported by piling. In this bed of concrete is formed the air duct for the forced draft.

The head of the dock and the side slopes for about 60 ft. from the head, are protected by concrete filling back of the altars, and at the point of junction of the timber work and masonry a wall of concrete is built back of the slopes, but the filling back of the altars in the remainder is made of earth excavated from the bottom of the dock.

The bottom and slopes of the basin are supported by piles, on mid-ship section, and capped by 12-in. x 12-in. timbers running longitudinally of the dock. Upon these caps are placed Oregon fir timber, spaced every 4 ft., to support the keel and side blocks. Every alternate floor timber is 70 ft. long, the others being 14 ft. The slope timbers at each side are framed into the top of the long floor timbers, and between each main slope timber is an intermediate slope, framed into a filler which is also framed into the sides of the long floor timbers.

The floor is made of 4-in. oak plank, spiked to joists, which rest upon and are bolted to the longitudinal caps of the piles. The surface of the floor slopes from the center to each side, and drains into the side drains of the dock. These again empty into a main cross drain which leads to the tunnel under the pumps. In this manner it is possible to keep the floor always dry, making it suitable for working under the keel of a vessel.

The plans and specifications were prepared and the work of construction superintended by James Ritchie and C. P. Ruple, Civil Engineers, of Cleveland, Ohio; the specifications and general plans of the pumping plant were prepared by C. L. Reeder, Mechanical Engineer, of Baltimore. The contractors for the several parts of the work were:

Excavation, piling, masonry and timber work, the Delaware Construction Company, of Wilmington, Del.;
Pumps and engines, The Morris Machine Company, of Baldwinville, N. Y.;
Boilers, The Heine Safety Boiler Company, of St. Louis, Mo.;
Steel caisson, The Spedden Shipbuilding Company, of Baltimore;
Power house superstructure, C. H. Fath & Son, of Cleveland, O.;
Steam and water piping, Wallace Stebbins & Sons, of Baltimore.

The Standard Box Car.

A resolution was adopted by the American Railway Association at its St. Louis meeting* that the Master Car Builders' Association be requested to consider and adopt the required external dimensions of the standard box car, based upon the interior dimensions prescribed by the American Railway Association, namely, a length of 36 ft., a width of 8 ft. 6 in. and a height of 8 ft.

The President of the M. C. B. Association immediately appointed as a committee on this subject the following: Chairman, C. A. Schroyer, Chicago & North Western; G. W. Rhodes, Burlington & Missouri River; W. P. Appleyard, New York, New Haven & Hartford; J. N. Barr, Erie R. R., and Joseph Buckner, Illinois Central. This committee met Nov. 30 and considered the limiting dimensions of the important railroad clearances, the present methods of car body construction and such matters as seem to bear on this subject. As a result the committee has issued a circular recommending to members exterior dimensions for the standard box car, and it is requested that the roads advise the Secretary, before Jan. 1, of their approval or disapproval; and if the recommendations are disapproved wherein they should be modified.

Briefly the recommendations are as follows:

For box cars having high trucks where the distance from the top of rail to the top of the floor of the car is 4 ft., the height of the car from the rail to the upper edges of eaves shall be 12 ft. 6¾ in., and the maximum width at eaves at this height shall be 9 ft. 7¾ in.

For box cars on low trucks where the distance from the top of rail to the top of the floor of the car is 3 ft. 6 in., the upper edges of the eaves shall be 12 ft. ¾ in. above the rail and the maximum width at the eaves at this height shall be 9 ft. 10 in. The committee has made no recommendations as to longitudinal dimensions, but holds the opinion that the strongest end construction should be used regardless of exterior longitudinal dimensions.

In determining the elevation of the eaves above the rail for the higher car the following details were used; the low car details differ only in being 3 ft. 6 in. from the top of the floor to the rail instead of 4 ft.

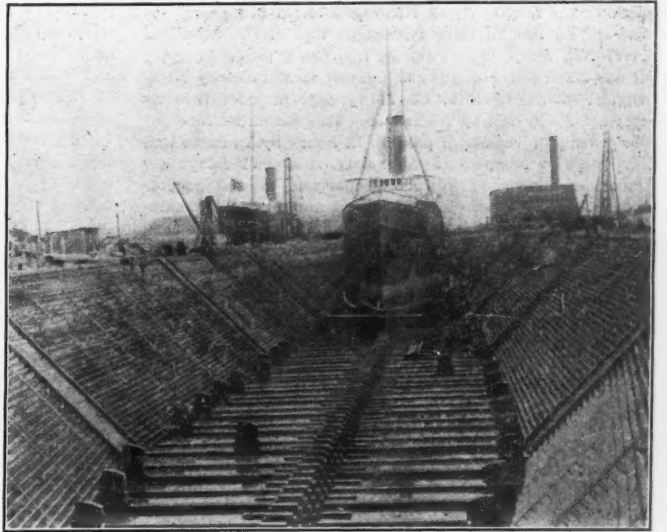
Top of rail to upper face of floor.....	4 ft. 0 in.
Upper face of floor to under edge of car-line.....	8 ft. 0 in.
Width of car-line at end where secured to plate.....	3 13/16 in.
Thickness of rafter to which metallic roof is applied.....	1 3/8 in.
Thickness of purlin to which roof boards are secured.....	1 1/4 in.
Thickness of roof boards.....	1 13/16 in.
Less pitch of roof from inside edge of plate to outside edge of eaves.....	12 ft. 7 1/2 in.
	¾ in.
	12 ft. 6¾ in.

*See Railroad Gazette, Nov. 1, 1901, p. 755.

The details for determining the maximum width at eaves of 9 ft. 7¾ in. for the car, 12 ft. 6¾ in. high are as follows:

Width between lining.....	8 ft. 6 in.
Thickness of lining.....	1 1/8 in.
Thickness of siding.....	1 1/8 in.
Thickness of posts and braces.....	6 in.
Air space between fascia boards.....	1 in.
Thickness of fascia boards.....	1 1/8 in.
Projection on each side for roof, ¾ in.....	1 1/2 in.

The circular says: "The committee believes that with the above allowances no difficulty whatever will be encountered in framing a car with a metallic roof as is ordinarily applied. Where a double board roof is applied with the ordinary construction, this width can be



The New Dry Dock at Baltimore.

reduced from ¾ in. to ¼ in. by using the usual 1¾-in. rabbeted fascia board, allowing the roof to project from ¾ in. to 1 in. over the fascia boards.

"The Committee recommends as a minimum distance from top of rail to bottom edge of outside sill not less than 1 ft. 6 in. This limit of dimension is recommended for the reason that on many roads there are girder bridges and viaducts which necessitate a limit at this point."

The Report of the Isthmian Canal.

The text of the report of the Isthmian Canal Commission is now available. The numerous drawings will not be published for some time.

At the outset we will state again an important fact which had been confused through the conduct of certain rogues who, we hope, may yet be brought to justice: The report is signed by all the members of the Commission and there is no minority report. On the 22nd of November a document was published in the New York Journal and in the Chicago American as a minority report by Mr. Morison. It is true that Mr. Morison wrote this as a minority report, and signed it as such, and filed it in the office of the Commission. After he had done this two important things developed, the policy of the officers of the New Panama Company made it impracticable to recommend the Panama route; and certain modifications were made in the body of the main report. This report was signed then by Mr. Morison with the rest of his colleagues and the minority report was withdrawn. However, this document was stolen from the office of the Commission and was published as a minority report. Finally, when the report of the Commission went to Congress many newspaper men in Washington, without taking the trouble to ascertain the facts, and misled by their "enterprising" colleague, telegraphed to their various journals the erroneous statement that a minority report had been sent in.

In concluding its report the Commission says: "After considering all the facts developed by the investigations made by the Commission, and the actual situation as it now stands, and having in view the terms offered by the New Panama Canal Company, this Commission is of the opinion that 'the most practicable and feasible route' for an Isthmian canal to be 'under the control, management, and ownership of the United States,' is that known as the Nicaragua Route."

The cost of building either canal is estimated as: For the Nicaragua canal, \$189,864,062; for the Panama canal, \$144,233,358. It should be kept in mind that these amounts do not include the cost of acquiring the concessions and right of way. Further the cost of acquiring the rights and property of the New Panama Canal Company must be added to the estimate of the cost of building that canal. The Commission estimates the value of these rights and of the property at \$40,000,000, which, if paid, would bring the Panama canal up to within 5½ millions of the Nicaragua canal; but the President of the New Panama Canal Company has never consented to name a price lower than \$109,000,000, which would bring the Panama canal to more than 63½ millions over the cost of the Nicaragua canal.

Further, the republics of Nicaragua and Costa Rica

are untrammelled by concessions or treaty obligations, all concessions having lapsed; but the government of Colombia has granted concessions to the New Panama Canal Company, which have yet many years to run. These concessions are limited in time and defective in other ways. They would not be adequate authority for the purposes of the United States, but while they exist Colombia is not free to treat with our Government. Therefore these concessions must be extinguished or removed before the two governments may enter into a treaty. This, as we have long anticipated, proved to be the deadlock.

The Panama canal would be 134.57 miles shorter than the Nicaragua canal, that is, the distances are respectively 153.66 miles and 49.09 miles. The length in standard section, and in harbors, and entrances is 73.78 miles by Nicaragua and 36.41 miles by Panama. The other part of the length of the Nicaragua canal is made up of the sailing line in Lake Nicaragua and of the canalized river San Juan. The Panama line has a lower summit; it has 22.85 miles of curve as against 49.29 miles by Nicaragua; it has a total of 771½ deg. of curvature as against 2,340 deg. by Nicaragua. The estimated time for deep draught vessels to pass is 12 hours by Panama and 33 hours by Nicaragua. Obviously, risks and delays are increased almost in direct proportion to the greater length of the canal. The estimated annual cost of maintaining and operating the canal is \$1,300,000 greater than the corresponding cost for operating the Panama canal. Nicaragua has no natural harbors, but "satisfactory harbors may be created by the removal of material at low unit prices and by the construction of protective work of well-established design." At Panama there is an excellent harbor in existence and at Colon there is a serviceable one. Some protective works are, however, needed.

The Commission has prescribed 35 ft. depth of water in the standard section; locks 84 ft. wide and 740 ft. long in the clear. The bottom width of the canal is fixed at 150 ft. In Panama Bay it is to be 200 ft.; in the San Juan River, 250 ft.; in Lake Nicaragua, 300 ft.; in the harbors of Colon, Greytown, and Brito, 500 ft.; and the channels are to be widened on curves. Twin locks are provided in every case and also guard gates.

The text covers 263 octavo pages and obviously we can now make but very fragmentary extracts from it. One interesting feature of the report is a history of Inter-oceanic projects and communications beginning with the earliest discoveries and explorations.

From the Annual Report of the Secretary of Agriculture.

Animal Industry.—The grand total of animals and animal products exported during the year exceeded \$250,000,000 in value. This Bureau inspected for export 385,000 cattle, 228,000 sheep, and 48,000 horses and mules, and nearly 1,000 vessels carrying live stock. Imported animals were also inspected to the number of 342,000, and, where necessary, quarantined. The meat inspection service involved the inspection at time of slaughter of nearly 37,000,000 animals. Of the more than 5,000,000 cattle inspected, the condemned carcasses were about ¼ of 1 per cent. In the control of indigenous diseases, 1,500,000 inspections were made and over 45,000 cars disinfected in the Texas fever service alone. The Secretary points out the serious evil resulting from a system of State inspection which, if it became general, would effectually prevent the marketing of live stock in some sections, and would destroy much of the usefulness of the Federal inspection. He regards the present conditions as so menacing to the interests of the cattle industry in the West and Southwest that he has requested the Attorney-General to co-operate in bringing the matter before the Supreme Court for decision as to the constitutionality of these State laws.

The Bureau of Forestry is co-operating with the Federal Government, with several States and many private owners in handling their forest lands. Altogether, assistance has been asked for a total area of 52,000,000 acres, of which 4,000,000 are held by private owners. During the year nearly 800,000 acres under private owners were examined by representatives of the Bureau, and four detailed working plans, covering 226,000 acres were prepared. The working plan for the Black Hills forest reserve was completed and working plans were undertaken for the Prescott and Big Horn, and the Priest River reserves.

Forest investigations include the study of commercial trees, and economic tree planting, of forest fires, grazing, lumbering, forest productions, and other important lines. The region containing the proposed Appalachian forest reserve was examined in co-operation with the United States Geological Survey and nearly 10,000,000 acres were mapped, lands classified, and the forests carefully studied. The Secretary regards the creation of the proposed forest reserve as urgent in order to protect the headwaters of important streams, to maintain the already greatly impaired supply of timber, and to provide a national recreation ground. Upon the request of the Secretary of the Interior, the effects of grazing and forest fires were investigated on 12 of the forest reserves.

In the study of economic tree planting in co-operation with farmers and others in making forest plantations, 46,145 acres were examined and plans were prepared for nearly 6,000 acres, while 148,000 applications for tree-planting plans were received.

Irrigation.—Investigations have been conducted and

embrace (1) studies of irrigation laws and the social and industrial institutions of irrigated agriculture, (2) investigations of the methods by which water is conserved, distributed, and used. The character of the titles to water finally recognized will do more than all other influences combined to determine whether the Western farmers ought to be tenants or proprietors. Confusion and trouble and almost endless litigation frequently attend the settlement of this question, and it is absolutely necessary that some simple and final method of determining and protecting rights to streams be provided. Irrigation experts of the Department have designed improved instruments for measuring water, by which registers are now furnished to irrigators at about one-half the cost of the foreign instruments. Attention is directed to the growth of irrigation in the humid regions. In Louisiana more money has been expended on pumping plants in the past two years than in any arid State. By irrigation, rice growing in Louisiana and Texas has raised the price of land originally worth \$5 to \$10 per acre to \$50 and even \$100. The Secretary expresses the belief that irrigation will, in the near future, become a subject for legislation by Congress, but the uncertain character of water rights can only be remedied by a larger measure of public control and the making of certain classes of irrigation structures permanently public works.

The Secretary condemns the desert-land act, stating that 640 acres is more land than a man of moderate means can cultivate under irrigation. Cutting down the entries from 640 to 320 acres is an improvement, but he believes in the entire repeal of the desert-land act and in requiring settlers or homesteaders to cultivate as well as live on their land.

Probably 400,000,000 acres of the public domain has no agricultural value except for pasturage. It is at present an open common, with no laws for its protection or disposal. He refers to the frequent conflicts of the farmers under irrigation with the range stockmen, and recommends, as a remedial and beneficial measure, the leasing of the grazing land in such a way as not to interfere with the homesteader. He winds up the discussion of this subject by presenting the following conclusions:

(1) That private enterprise will have to be supplemented by public aid in the construction of certain classes of irrigation works if we are to secure the largest development of Western agriculture.

(2) That reservoirs located in the channels of running streams should be public works.

(3) That the first step toward national aid for irrigation should be the passage of enlightened codes of water laws by the States to be benefited.

(4) That the land laws should be modified by repealing the desert act and by requiring cultivation as well as residence on a homestead.

(5) That the non-irrigable grazing lands should be leased in small tracts so as to unite the irrigable and the pasture lands.

Public Roads.—In establishing an Office of Public Road Inquiries, the object was to promote the improvement of public roads throughout the country. Efforts were first directed to ascertain the condition of the roads, the state of public opinion in regard to their improvement, the obstacles in the way, and the best methods to be employed in securing better roads. For spreading information and awakening interest, nothing has been found so effectual as the "object-lesson" of sample roads which, during the past year, have been built in nine States under the advice and supervision of the office. In building these sample roads, machines have been loaned by manufacturers and carried free by the railroad companies, while the local community furnishes material and labor. During the year, for the better carrying out of the work of the office, the United States was divided into four divisions, the eastern, middle, western, and southern, each under a special agent.

The Use of Electricity on Railroads.*

In my official capacity it is not my duty to determine the speed at which trains should travel, but I cannot refrain from expressing my conviction that if it were possible to lessen the enormous difference which now characterizes the speed of passenger and goods trains great advantages would follow. This can only be accomplished by lessening the mass of the goods and mineral trains, and bringing it more under the control of the brake—a result which probably will never be attained under the steam locomotive regime. . . . As there would be no shunting for the reason that, with the exception of the express trains, all would be moving at about the same speed, it is clear we should practically double the capacity of the line, and that without increasing the labor charges, because, although we double the trains, we halve the time. The number of trains that would come under this category would probably be 75 per cent. of the entire number, and if the method would admit of the acceleration of the expresses also it may well claim an increased capacity of 100 per cent. In other words, such a result would avoid that duplication of lines which is now unavoidable and which is adding so many millions, year by year, to the capital account.

The operation by electrical means of the passenger

*Extracts from the Inaugural address delivered as President of Institution of Electrical Engineers (British) by William Langdon, Esq., Electrical Superintendent, Midland Railway.

traffic as it is conducted to-day would appear to present no difficulty, for if necessary each carriage could be provided with the necessary motors for its propulsion; but to work a railroad economically—to reap the full advantages of an electrical service—it is necessary that the entire traffic of the line, goods as well as passenger, should be worked by the same means. To work one class of traffic by electricity and the other as at present, by steam units, although such a course is quite practicable, would involve a large increase in both capital and current charges; for the cost of establishing and operating electrical working for the passenger traffic would be very little less than it would be if dealing with the entire traffic, and there would still remain the cost attending that portion worked by the steam locomotive. Such a course appears to me impracticable. . . . Assuming it were determined to test the possibilities of electricity on a given section of a line of railroad, whatever that section might be, the electric motor would require to haul the trains that might reach that section of line as they were handed over from, or required to be carried forward by, the steam locomotive. It would, in fact, have to take the place of the latter, and do its work. It may be said its capabilities to do this under all conditions have not been proved. It will, however, be clear that assuming one electric locomotive incapable, there is no reason why two should not be coupled together in the same manner that steam locomotives are coupled. . . .

Electricity is credited with the power of accomplishing greater speed at a less cost than steam. An impression is abroad that greater facilities for rapid transit between large centers of commerce are a necessity of the day. If it should transpire that electric propulsion is inapplicable to main-line traffic as a whole—a conclusion which few would, even at the present moment, accept—it will unquestionably lead to the establishment, between the chief commercial centers, of high-speed passenger electric traction on independent lines. . . .

It is clear that for main lines an overhead electrical service is inadmissible; and equally, to my mind, is a rigid or semi-rigid rate of speed. With a line carrying one class of traffic, this latter question may not be so important, but on lines carrying a mixed traffic this cannot be so, for the power to vary the speed is a factor which must have an important bearing upon the working of the line. The speed, subject to a maximum limit, must be in the hands of the driver. To those with whom may rest the privilege to establish electrically worked lines I would with all respect venture to say: Be careful that you do not retard that great work which sooner or later must invite attention. In the establishment of light high-speed, point to point, passenger lines little difficulty may be encountered. It is not, however, with them that the interest of the country needs your aid, so much as in the conversion of those lines which are already established. It is where competition of a fruitless character steps in, that capital will be squandered.

Train Accidents in the United States in November.*

rc, 1st, Little Rock & Fort Smith, Mayflower, Ark., a freight train ran into the rear of the preceding train, wrecking the passenger car; six passengers were killed.

bc, 1st, Pittsburgh, Fort Wayne & Chicago, Donelson, Ind., a train consisting of an engine and a caboose, with the caboose in front, collided with a freight train, and the caboose was wrecked. Three employees were killed and five injured.

xc, 1st, Pittsburgh, Cincinnati, Chicago & St. Louis, Middletown, Ind., collision between a passenger train and a freight; one engine and fatally injured.

eq, 1st, Norfolk & Western, Ironville, Va., a freight train was derailed by the breaking of the flange of a wheel and 14 cars of coal were wrecked.

unx, 1st, Chicago, Indianapolis & Louisville, Cedar Lake, Ind., a passenger train was derailed and a sleeping car was overturned; one passenger was injured.

rc, 2d, 2 a.m., Cleveland, Cincinnati, Chicago & St. Louis, Delaware, Ohio, an eastbound freight train, which had been stopped at the entrance of the yard, was run into at the rear by a following freight. The caboose and one car fell down a bank and were wrecked. The wreck took fire and was partly burnt up; the conductor was killed.

rc, 2d, Louisville & Nashville, Big Stone Gap, Va., a freight train ran into the rear of the preceding freight, which was standing at a water tank. A caboose and several cars were wrecked and one engine and a passenger were killed. It is said that the second train became uncontrollable on a steep grade.

rc, 2d, Central of New Jersey, 4 a.m., Greenville, N. J., a passenger train approaching the station was run into at the rear by a train of empty passenger cars, and considerable injury was done. The conductor of the foremost train was killed. There was a dense fog at the time.

o, 2d, Pittsburgh & Lake Erie, Shannopin, Pa., the locomotive of a freight train was wrecked by the explosion of its boiler; engine and two other trainmen injured.

3rd, 4 a.m., Chicago, Milwaukee & St. Paul, Watertown Junction, Wis., a C. M. & St. P. passenger train ran into a C. & N. W. freight train, at the crossing of the two roads, and the engines and four cars were wrecked.

*The Railroad Gazette monthly train accident record is now made up in a form somewhat different from that formerly used. Accidents in which injuries are few or slight and the money loss is apparently small, will usually be omitted from the list. The tabular statement of totals will be omitted entirely, as a more complete report of the total number of accidents occurring will probably be published by the Interstate Commerce Commission. The separation of the classes is abandoned, but the classification will be indicated by the use of the following

ABBREVIATIONS.

rc Rear collisions.
bc Butting collisions.
xc Miscellaneous collisions.
dr Derailments; defect of roadway.
eq Derailments; defect of equipment.
dn Derailments; negligence in operating.
unf Derailments; unforeseen obstruction.
unx Derailments; unexplained.
o Miscellaneous accidents.

It is said that the air-brakes on the passenger train were out of order.

rc, 4th, Philadelphia, Wilmington & Baltimore, Claymont, Del., collision between a freight and a work train; five freight cars derailed and partially destroyed by fire; one fireman killed; two other trainmen injured.

xc, 4th, Chicago, Indianapolis & Louisville, Bedford, Ind., a train consisting of several cars of stone and two passenger cars broke in two and the rear portion afterward ran into the forward one; one trainman and 30 passengers were injured. It is said that on the stone cars air-brakes were in use but that the passenger cars were not equipped with air.

rc, 5th, Illinois Central, Shandy, Tenn., a freight train standing at a water tank was run into at the rear by another freight drawn by two engines. Both engines, caboose and several cars wrecked.

rc, 5th, Atchison, Topeka & Santa Fe, Pinole, Cal., a passenger train ran into the rear of a preceding freight; engine and several cars wrecked; engineman killed.

xc, 5th, 5 a.m., Chicago, Burlington & Quincy, Riverside, Ill., a freight train switching on the main track was run into by the fast mail train and both engines were badly damaged; three trainmen injured. There was a dense fog at the time.

dr, 5th, Pennsylvania road, Mt. Etna, Pa., a passenger train was derailed by a broken rail and the baggage and smoking cars were overturned; the conductor was injured.

rc, 6th, 2 a.m., Baltimore & Ohio, Point Mills, W. Va., a freight train ran into the rear of a preceding freight, wrecking the engine and nine cars. The derailed engine ruptured a large gas pipe in the ground and the gas was ignited from the fire in the fire-box, and the wreck was entirely burned up.

xc, 6th, 1 a.m., Pittsburgh, Cincinnati & St. Louis, Pittsburgh, Pa., a butting collision between engines in the yard, badly damaging both engines and a caboose. The caboose took fire but the flames were soon extinguished. Two brakemen were killed and one was injured.

xc, 6th, Wisconsin Central, Lake Emily, Wis., a freight train ran into some gravel cars which had accidentally run out from a side track, and the engine and seven cars were wrecked; three trainmen were injured.

unx, 6th, Norfolk & Western, Shawsville, Va., a freight train was derailed and 15 cars of coal were wrecked; a tramp was killed.

xc, 7th, St. Louis & San Francisco, Springfield, Mo., collision between a freight train, drawn by two engines, and a switching engine; three trainmen killed, two of them being scalded to death.

xc, 7th, Union Railroad, Homestead, Pa., a car which escaped control in switching ran some distance down a grade and collided with other cars on which were six ladies filled with molten metal. The cars were overturned and fell off a high bridge into the Monongahela River. Four men were injured, one of them being badly burnt. A terrific explosion occurred when the molten metal struck the water in the river.

eq, 7th, Northern Pacific, Fort Harrison, Mont., a freight train was derailed by a broken rail, and 18 cars were wrecked; two trainmen were injured, one fatally.

rc, 8th, Chicago Great Western, Elizabeth, Ill., rear collision of freight trains at a water tank, damaging caboose and 15 cars. A brakeman, off duty, riding in the caboose, was killed.

unx, 8th, 8 p.m., Texas & Pacific, Napoleonville, La., a passenger train was derailed and the engine was overturned. The fireman was killed and the engineman injured.

o, 8th, Lake Shore & Michigan Southern, Port Clinton, Ohio, a pile of long iron beams loaded on two cars in a freight train fell off while the train was passing a sharp curve and did a good deal of damage to the adjoining track; two cars of the train were also badly damaged and partly derailed.

rc, 9th, Pittsburgh & Western, Lowellville, Pa., a freight train ran into the rear of a preceding train, badly damaging engine and several cars. The fireman was killed and two other trainmen were injured.

rc, 9th, Western Maryland, Lurgan, Md., rear collision of freight trains; one trainman killed.

rc, 9th, 11 p.m., Missouri Pacific, Paola, Kan., a freight train which had been unexpectedly stopped was run into at the rear by a following freight, and the engine and several cars were badly damaged. The engineman was killed.

eq, 9th, Baltimore & Ohio, North Mountain, W. Va., a freight train was derailed by the breaking of the flange of a wheel, and 10 loaded steel cars were scattered across three tracks.

rc, 11th, Oregon Railroad & Navigation Co., La Grande, Ore., a passenger train ran into a preceding empty engine which had been stopped in consequence of delay to a freight train ahead of it, and the passenger train, empty engine, and the freight train were all considerably damaged, the caboose and one stock car being wrecked. Several passengers were slightly injured.

rc, 11th, 9 p.m., Chicago, Milwaukee & St. Paul, Correll, Minn., a freight train standing at the station was run into at the rear by a following freight; engine and 12 cars wrecked; two trainmen killed.

unx, 11th, St. Louis, Iron Mountain & Southern, Prescott, Ark., the tender of the locomotive of a work train was derailed and overturned; three employees were killed and 18 injured. The locomotive was running backward and it is said that the derailment occurred where the track was not in good condition.

rc, 12th, Boston & Albany, Charlton, Mass., an east-bound passenger ran into the rear of a preceding freight, badly damaging the passenger engine at the rear end of the freight train. The freight had been stalled on the grade and it had been found necessary to go back some distance and push a part of the cars ahead of the engine; and while moving in this way the train ran into a preceding freight doing slight damage, and causing delay. The passenger train had passed an automatic signal, at the entrance of the block signal, warning the engineman to run under control.

bc, 12th, Central of Georgia, Macon, Ga., butting collision of locomotives; one engineman fatally scalded. One of the engines, after the collision, ran back several miles unattended.

eq, 12th, Louisville & Nashville, Cullman, Ala., a freight train was derailed by a broken flange, and 18 cars were wrecked.

unx, 12th, Chicago, Milwaukee & St. Louis, Sewell, Iowa, a freight train was derailed, and the engine and 21 loaded cars fell down a bank.

xc, 14th, Osage City, Kan., a freight train of the Atchison, Topeka & Santa Fe ran into a freight of the Missouri Pacific at the crossing of the two roads. The Atchison locomotive was overturned and the fireman of it was fatally injured. Another person riding on this engine was killed. It is said that both of the trains had stopped just before approaching the crossing.

eq, 14th, Alabama Great Southern, Powderly, Ala., a freight train was derailed by a broken journal and several cars were wrecked; a man stealing a ride was killed.

rc, 15th, 5 a.m., Southern Railway, Wellington, Va., a freight train standing at the station was run into at the rear by another freight, wrecking the caboose and several cars. Two trainmen were killed. The wreck took fire and a part of it was burned up.

xc, 15th, Chicago, Milwaukee & St. Paul, Slater, Iowa, a freight train descending a steep grade broke in two and the rear portion afterward ran into the forward one. A tramp was killed and another injured.

unf, 15th, 10 p.m., Northern Central, York, Pa., a passenger train was derailed while running at full speed, by the wrecking of the locomotive and a part of the track by an explosion of dynamite, and three cars were derailed. It was conjectured that the dynamite was placed on or near the track by persons hoping to rob the train.

rc, 16th, Pennsylvania road, Newport, Pa., a west-bound passenger train ran into the rear of a preceding freight, making a bad wreck. Engineman and fireman injured, probably fatally.

rc, 16th, Chicago Great Western, St. Charles, Ill., a passenger train traveling at high speed ran into the rear of a preceding milk train, wrecking the passenger car at the rear of the foremost train and badly damaging the engine. One passenger was killed and another fatally injured; and the engineman and one passenger were seriously injured.

bc, 16th, 4 a.m., Oregon Short Line, Orchard, Idaho, butting collision between a freight train and an empty engine which was moving backward. Engines and ten cars wrecked; one engineman and one brakeman killed; two firemen injured. It is said that the engineman of the freight disregarded a meeting order.

unf, 16th, 1 a.m., Philadelphia, Wilmington & Baltimore, Farnhurst, Del., passenger train No. 97 was derailed at a switch which is believed to have been maliciously misplaced, and the engine and baggage car were overturned. Several freight cars on the siding were wrecked. The fireman was injured.

bc, 17th, Great Northern, Culbertson, Mont., butting collision between a freight train and a work train, wrecking engine and several cars. Ten laborers of the work train were killed and 18 injured. The men who were killed, and most of those injured, were in a car which was being pushed.

rc, 18th, Philadelphia & Reading, Tamanend, Pa., a freight train ran into the rear of a preceding freight, damaging the engine and several cars. A part of the wreck fell against a freight train of the Central of New Jersey, standing on the track of that road, which is parallel to and some distance below that of the Reading. One trainman was killed and two were injured. Several cars were wrecked and the wreck was partly destroyed by fire.

bc, 18th, Pennsylvania road, Selin's Grove, Pa., butting collision of freight trains, each of which was drawn by two engines; three of the engines and several cars of coal were wrecked; three trainmen were injured.

rc, 19th, Metropolitan Elevated of Chicago, at Marshfield avenue, rear collision of passenger trains, doing slight damage. A passenger standing on the rear platform was killed, and several passengers were injured.

rc, 19th, 11 p.m., Chicago & Alton, Manchester, Ill., a through freight train ran into the rear of a preceding local freight. Six cars derailed; fireman killed.

dn, 19th, 7 p.m., Chicago, Milwaukee & St. Paul, Rondout, Ill., a freight train approaching the crossing of the Chicago & North Western was derailed at the derailling switch, and 17 cars were derailed. There was a dense fog at the time.

unx, 19th, Lehigh Valley road, Ulster, Pa., a freight train was derailed, and the engine and nine cars were wrecked. A man stealing a ride was killed.

bc, 20th, 5 a.m., Atchison, Topeka & Santa Fe, near Franconia, Ariz., butting collision between westbound express train No. 3 and east bound express train No. 4, the latter drawn by two engines. The collision was a violent one and the forward portions of both trains were completely wrecked. The wreck took fire and two composite cars, two dining cars and one sleeping car were burnt up. One conductor, one engineman, three firemen, two dining car waiters, and the barber were killed, and 12 other employees on the trains were injured. Only three passengers were injured. One of the locomotives exploded. Two of the engines had fuel oil in the tender, which greatly intensified the fire. All of the cars in both trains were vestibuled and to this construction is attributed the comparative immunity of the passengers.

The westbound train was running contrary to a telegraphic order, according to which it should have stopped at Franconia station.

bc, 20th, Mobile & Ohio, Chunchula, Ala., collision between a passenger train and a freight, wrecking eight cars. Seven passengers and four trainmen were injured. It is said that an operator neglected to deliver an order to one of the trains.

xc, 20th, Chicago, Burlington & Quincy, Walnut, Ill., a freight train ascending a grade broke in two and the rear portion ran back some distance and collided with the following freight train. The caboose was wrecked and a passenger riding in it was burned to death. Nine other passengers were injured.

xc, 20th, Illinois Central, Harrison, Tenn., a mixed train broke in two, and the rear portion, consisting of one passenger car, ran into the forward portion, which had been stopped after precautions had been taken which, it was thought, would prevent a collision. Three passengers were injured.

dn, 20th, 3 a.m., Union Pacific, Benton, Neb., a freight train was derailed by running over a misplaced switch, and two engines and five loaded cars were wrecked. A fireman and a tramp were injured.

bc, 21st, Louisville & Nashville, Black Rock, Ala., butting collision of freight trains, wrecking both engines and several cars. Four trainmen killed; seven injured. It is said that the men in charge of one of the trains neglected to examine the train register at a junction.

bc, 21st, Southern Pacific, Boca, Cal., a special passenger train, carrying members of the Traveling Passenger Agents' Association, collided with a freight train, wrecking both engines and a baggage car. Three passengers were injured.

xc, 21st, Oregon Short Line, Weiser, Idaho, a locomotive sent out some distance from the station, to give a whistle signal to call in a work train, was not properly controlled, and collided with the work train, which was backing toward the station. The empty engine, having been reversed and deserted, ran back and collided with its own train, damaging several cars. In the first collision the engine coupled itself to one of the cars of the work train which, after being pulled some distance, was derailed, but it broke away from the engine, and the engine kept on.

xc, 21st, Burlington, Cedar Rapids & Northern, Trosky, Iowa, a freight train broke in two, and the rear portion afterward ran into the forward one, damaging 16 cars; two trainmen injured.

unf, 21st, Pennsylvania road, Larimer, Pa., the second section of eastbound train No. 4 was derailed at a switch which is said to have been tampered with, and

the engine and several baggage cars were badly damaged; one express messenger was badly injured.

unx, 21st, St. Louis Southwestern, Goldman, Ark., a freight train was derailed and the engine overturned, and 16 loaded cars were wrecked. A conductor was killed and three other trainmen were injured.

bc, 22nd, 1 a.m., Seaboard Air Line, Greenwood, S. C., butting collision between a freight train and a switching engine. One fireman was killed and two other trainmen were injured.

unx, 22nd, International & Great Northern, Gentry, Texas, a mixed train was derailed and two passenger cars were overturned. Six passengers were injured.

eq, 23rd, 11 p.m., Southern Pacific, Middle Creek, Cal., a freight train was derailed by a broken wheel and three cars were wrecked. A man riding in one of the cars was killed.

unx, 23rd, Northern Pacific, Helena, Mont., a work train was derailed; engineman killed, fireman injured.

unx, 23rd, Norfolk & Western, Glenlyn, W. Va., a freight train was derailed and seven cars were wrecked. A tramp was killed.

unx, 23rd, Texas & Pacific, New Camp, La., a freight train was derailed and the engine and several cars were wrecked. Four trainmen were injured.

bc, 24th, Delaware, Lackawanna & Western, Morristown, N. J., butting collision of passenger trains, badly damaging both engines and one baggage car. One passenger and one trainman injured.

eq, 24th, Chesapeake & Ohio Beaver Creek, Va., a freight train was derailed by the breaking of the flange of a wheel, and 16 cars were wrecked.

o, 24th, Northern of New Jersey, Leonia, N. J., the locomotive of a passenger train was badly damaged by overhead wires which hung from a bridge above and intercepted the passage of the engine while it was running at considerable speed. The wires belonged to a street railroad line and had been loosened by a storm.

dr, 25th, Southern Pacific, Carbondale, Cal., the engine and two forward cars of a mixed train were derailed by a broken rail and were overturned in the ditch. A brakeman was killed and two other trainmen were injured.

unx, 25th, Louisville & Nashville, Georgiana, Ala., a freight train was derailed and seven cars were wrecked. A tramp was killed.

xc, 26th, Wabash road, Delphi, Ind., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, damaging nine cars. Two tramps were injured, one of them fatally.

unx, 26th, 9 p.m., Missouri, Kansas & Texas, Bonita, Texas, a passenger train carrying immigrants was derailed and one coach was overturned. Several passengers were injured.

bc, 27th, Chicago & Northwestern, Fort Atkinson, Wis., butting collision between a passenger train and a freight, badly damaging both engines; three trainmen injured.

bc, 27th, 6:40 p.m., Wabash road, Seneca, Mich., butting collision of passenger trains, both running at full speed, wrecking both engines and 10 or more cars. The wreck took fire and was mostly consumed. Twenty or more passengers and three trainmen were killed, and many passengers were injured; exact number is yet to be determined. Both trains had electric headlights. The collision was primarily due to the misreading of a telegraphic order by the engineman of the eastbound train. This collision was reported in the *Railroad Gazette* of Dec. 6.

unx, 27th, Pennsylvania road, West Philadelphia, Pa., a locomotive was derailed and the engineman was killed.

o, 27th, Atchison, Topeka & Santa Fe, Needles, Cal., a passenger car in an eastbound passenger train was set afire and badly damaged by the explosion of a gas tank.

xc, 28th, Chicago & North Western, Sparta, Wis., a freight train became stalled in a tunnel, and the men on the engine, to avoid suffocation, uncoupled the engine and ran out of the tunnel. It appears that the cars were left standing in the tunnel, with the air-brakes applied; and that, the air leaking off after a time, the cars ran back into the head of a following freight train, the collision occurring near the entrance of the tunnel. A drover in the caboose was killed and one trainman was injured.

rc, 29th, 1 a.m., Delaware, Lackawanna & Western, Tully, N. Y., a special passenger train ran into the rear of a preceding freight, wrecking the caboose and doing other damage. Ten passengers were injured.

unx, 29th, Atlanta, Knoxville & Northern, Ducktown, Tenn., a freight train was derailed and the engine and several cars fell down a bank. The conductor and engineman were killed; two other trainmen injured.

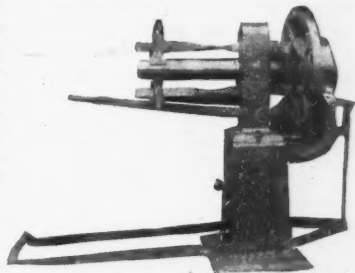
Belt-Driven Flue Welding Machine.

The accompanying engraving shows a flue welding machine made by Maddocks & Herschell, Princeton, Ind., which is now being used in railroad shops. The machine is driven by a belt and friction clutch at the rear, one man only being required for its operation. The machine is run at 125 to 135 revolutions

a minute and from 12 to 15 revolutions are usually sufficient to weld a flue, so the capacity depends upon how fast the flues can be heated and handled. These machines, built in three styles, can be used for flues ranging from 1 1/4 to 4 in. in diam. A complete set of tools are furnished for scarfing and these tools are kept in the box formed in the base of the machine.

The mandrels are finished so the flue is a nice fit when cold, and when heated for welding the flue goes on easily. The swedges or hammers also conform to the flue, so that when welded the flue is finished smooth and true to size inside and outside. The machine is automatic and ramming the flue on the mandrel for welding starts the machine, the flue being turned and the two hammers operated together. When scarfing, one hammer only is used. In working the machine by hand the rear bracket and clutch are removed and a crank is substituted.

The machine ready for shipping weighs 650 lbs., and it requires a floor space 18 in. sq.





ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

The compilation of gross earnings for November, of 105 roads, covering 108,000 miles, was printed last week by *The Chronicle*. The actual increase amounted to \$7,788,293, or 12.2 per cent. For the year, January 1 to November 30, returns are given from 98 roads and 107,000 miles, the increase being \$67,253,070. Only 14 roads out of 105 show losses for the month, while the monthly gains by some of the roads are very large. The Northern Pacific and the Great Northern each show more than a million dollars, while the Canadian Pacific shows over three-quarters of a million, and the Missouri Pacific nearly half a million dollars. The Baltimore & Ohio and St. Paul each show gains in gross for the month of more than \$389,000; and the Illinois Central has \$355,000. It is assumed that the principal factor in the improvement in revenues is "the wonderful activity and steady expansion in the volume of trade."

We believe that we are accurate in saying that the new freight equipment authorized by the Pennsylvania Railroad Company numbers now 20,615 cars, and of these cars 19,615 are ordered. It is supposed that all of these will be delivered by the middle of next summer. These cars are placed as follows: Pressed Steel Car Co., 12,686; American Car & Foundry Co., 5,150; Illinois Car & Equipment Co., 1,275; Altoona, 400; the Pullman Co., 104. Besides these, 15 refrigerator cars for the Grand Rapids & Indiana have been ordered from the American Car & Foundry Co. These cars are all of 100,000 lbs. capacity. Of course, we do not know the contract price, but it is something over a thousand dollars, therefore we have here in round numbers \$21,000,000 of equipment orders.

All of these cars have steel underframes, and the coal cars are all steel. As we have said before in speaking of these great equipment orders, they have a certain peculiar significance in fixing policy and practice as regards capacity and as regards steel underframes. In both of these particulars this Pennsylvania order is a step of unusual importance.

The verdict of the coroner's jury on the Seneca collision is reported in another column, where also will be found a circular issued by the State Railroad Commission on the questions connected with the cause of that collision. For a thorough understanding of the lessons of this case it will be necessary to wait for more detailed information; but we may observe that the coroner's report seems to answer a number of the questions which we raised concerning the responsibility of the several trainmen and the rules which they should have carried out. A significant thing about the Commissioner's circular is that he

proposes to try to make uniform on all roads in Michigan certain practices which the American Railway Association has been (and is) content to leave un-uniform. A discussion of some of these things by operating offices ought to be instructive. For example, one of the things mentioned by Commissioner Osborn—fastening train orders up in the cab of the locomotive where they can be easily seen—was formerly prescribed in the standard Code, but now is not. What is the matter with this rule? The suggestion about educating firemen is good; but there are a number of things to be said on the point before the proposition can be made thoroughly effective.

Heavy Freight Locomotives of the Atchison, Topeka & Santa Fe.

In our issues of Nov. 22 and Nov. 29 we gave the latest articles of an intermittent series beginning Jan. 18, telling of the systematic increase of power in passenger locomotives of the Atchison, Topeka & Santa Fe. The illustrated articles include four classes of coal-burning locomotives and one oil burner. Information was also given editorially about requirements of the system and results obtained from the locomotives.

Likewise, in the *Railroad Gazette*, June 16, 1899, appeared an illustrated description of the heaviest consolidation freight locomotives then on the Santa Fe system, one a Baldwin simple locomotive, and one a four-cylinder tandem compound which is a product of the Santa Fe's Topeka shops. Full data from a test of these locomotives were given. Since then there have been some 21 x 30 in. consolidation road locomotives and some 21 x 32 in. pushers, for the mountains, added to the equipment.

The information we now give completes, for the present, a summary of the heavy freight locomotive development, from which it may be seen that the latter has not only kept pace with the passenger locomotive work but bids fair to soon outstrip it. There are 74 decapods ordered at Baldwins, and the American Locomotive Co. is building two at the Schenectady works, which we shall describe later. They will be four-cylinder tandem compounds, on the basis of the Player (Santa Fe) type, with cylinders 19 and 32 x 32 in., 57 in. driving wheels, and about 230,000 lbs. on drivers, out of a total weight of 260,000 lbs. Fifty of them are to be oil burners with the new Player boiler and 5,800 sq. ft. of heating surface, arranged in general as in the oil-burning consolidation boiler drawings shown elsewhere in this issue. The coal-burning decapods will have about 5,200 sq. ft. of heating surface.

The illustrations in this issue include Mr. John Player's unusually interesting boiler, and the locomotive, No. 824, is big enough to engage attention by its weight and proportions alone. There is something in connection with the building of this locomotive, as to time, that is worth telling. On Oct. 22 the Baldwin Locomotive Works received an order to build 120 A. T. & S. F. locomotives; 45 to be Prairie type, like No. 1,000 shown in our issue of Nov. 22, but all of the 45 to have traction increasers front and back; the other 75 to be decapods. Thirty-five consolidations were then being built and it was decided to drop one from the decapod order and make it a consolidation like the other 35, except that it should have the new Player oil-burning boiler. This was arranged by telephone from New York on Oct. 22, and a Santa Fe boiler drawing was sent to Baldwins. The locomotive, as shown in the half-tone illustration appearing with our descriptive article, went out of the Baldwin shops complete on Dec. 3, 36 working days from the time the order was given, and it was carried along with regular work. The locomotive was fired, tested and worked in Philadelphia until Dec. 13, and is now working westward to Needles, Cal. Later it will be given a chance at the work on Tehachapi Mountains, between Mojave and Bakersfield.

We take some pleasure in recording this finishing of an original and unusual design in so short a time. It tells part of the story of how the American locomotive builder has made his way into the markets of the world. That this present task was not a small one is emphasized in the photograph by the appearance of two six-foot men, John Player and Samuel Vauchlain, beside their finished work.

This boiler design held so much promise of good results that engine No. 824 was built in quick time to determine whether some of the decapods should burn oil in the same way. The tests at Philadelphia were so satisfactory that no doubt remains to those who are most closely concerned, and fifty of the decapods will therefore be equipped with three corrugated cylindrical fire-boxes and a combustion chamber each, adapted to the greater requirements.

Two hundred and fourteen thousand six hundred pounds total weight, by scales, and 4,266 sq. ft. of heating surface, making about 50 lbs. total weight per square foot of heating surface, for the first engine of its class, with 45,800 lbs. tractive effort, working compound, and about 55,000 lbs. working high-pressure, make conditions that require some little time for properly settling in the mind after one has watched the ratio with much painstaking fought down, pound by pound almost, in lighter locomotives, from high above 60 to the neighborhood of 50, generally on estimated weights which are exceeded in building, in the present year's remarkable work of design. The estimated figures for the decapods, 260,000 lbs. total weight, and 5,800 sq. ft. of heating surface, promise to reduce the ratio to 45, perhaps 44, and it is apparent that the coming of this boiler marked the passing of a generally accepted idea of what were the fixed limitations of these factors in locomotive design.

We have mentioned elsewhere a few totals of heating surface, for comparison, as found in other big locomotives, regardless of class, but in many cases estimated total weights and ratios had to be used, and they are therefore not republished. These things are all so fresh in the minds of our readers that it is unnecessary to extend the list of examples very far.

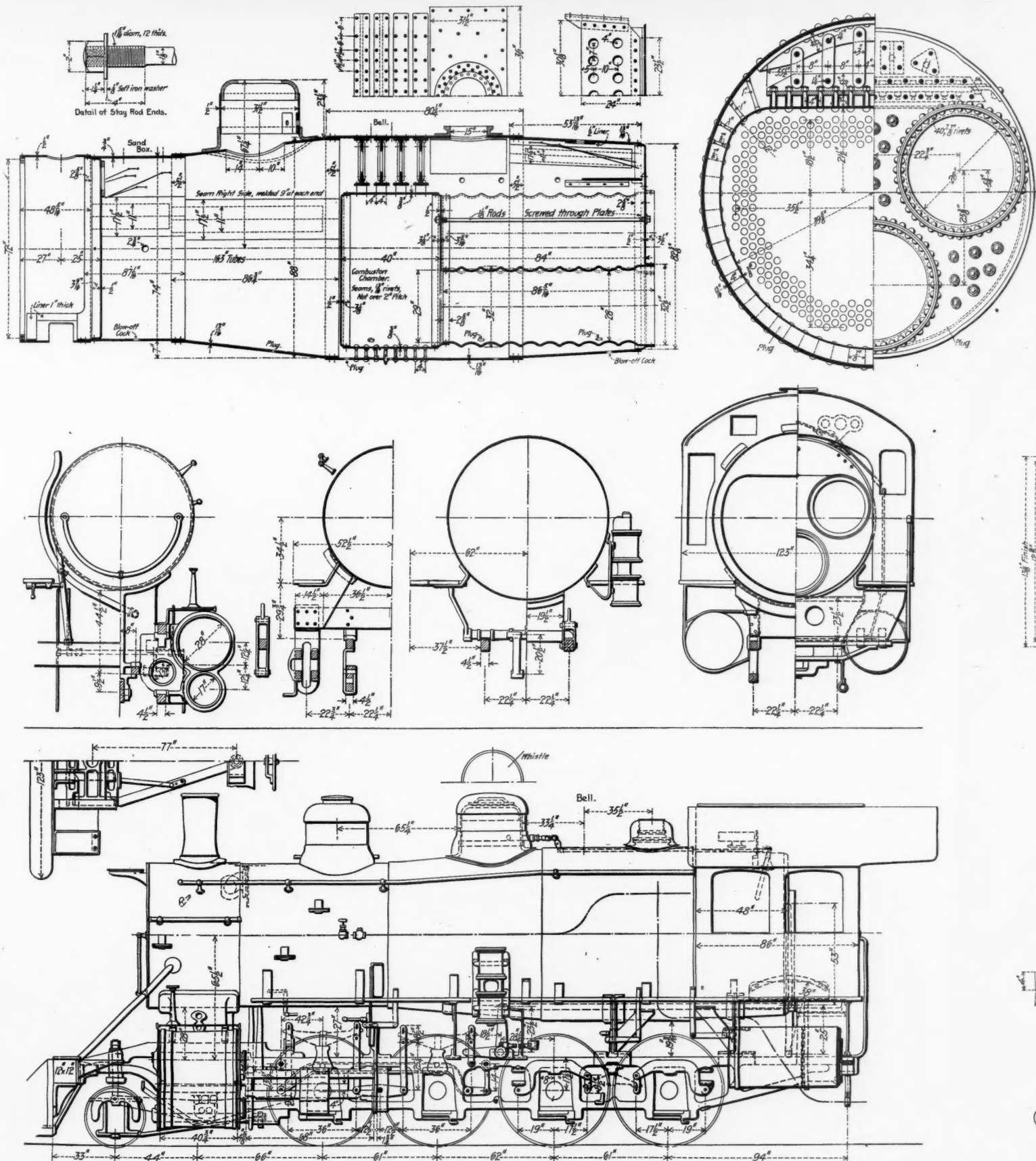
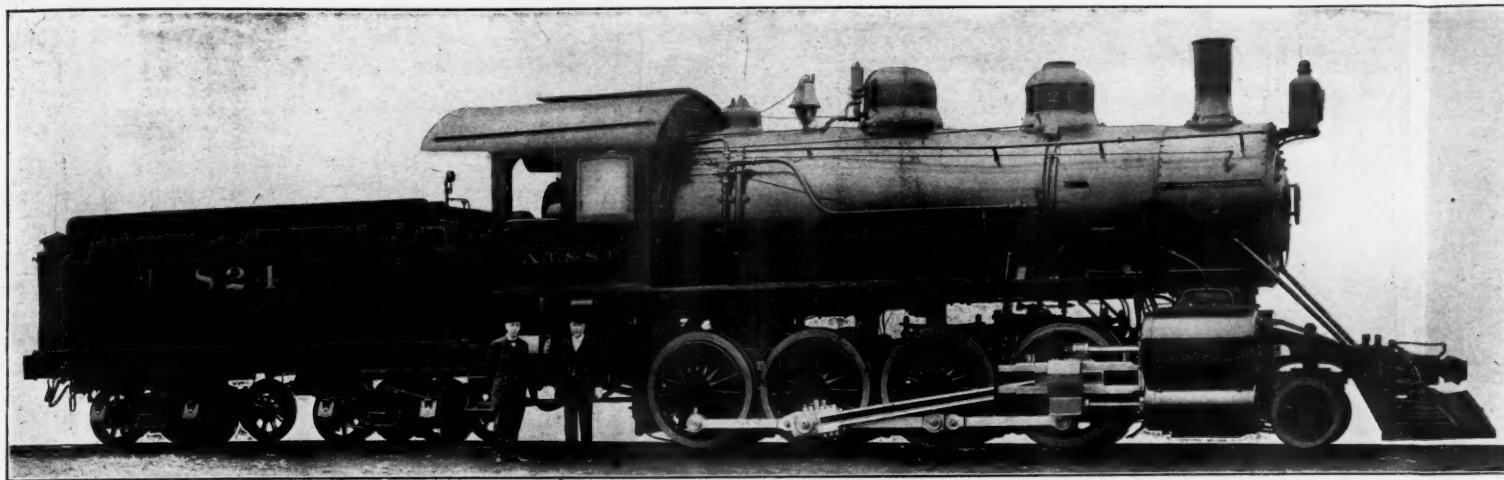
The courageous design of this Player boiler is, after all, the most engaging thought, and to that we have given most attention. The readiness of Baldwins to build it is characteristic. Locomotive No. 824 is a credit alike to the designer and the builder, and if acquaintance with work in the field it is being sent to gives a fair criterion from which to judge, we should say that this type of locomotive is likely to prove a very good investment for the Santa Fe. It is pleasant to add this record of progress in locomotive work to the long list of achievements in locomotive building which we have placed before readers of the *Railroad Gazette* in 1901.

The Pennsylvania Tunnel Across New York.

The plan for connecting the Pennsylvania Railroad with the Long Island Railroad by a tunnel across New York City is not surprising or unexpected to those who have been at all familiar with the course of events. More than a dozen years ago, we should say at a guess at least 14 years ago, some of the Pennsylvania people, and especially the gentleman now President of the company, were much interested in a plan for getting to Brooklyn by way of Staten Island with a tunnel across the Narrows, and we judge that this conception has never been allowed to sleep in their minds. Probably the purchase of the Long Island Railroad itself was a part of this same idea. Underneath it lies the fact that Brooklyn is a great city and is destined to become a far greater city than it now is. The real strategic importance of this move, therefore, is the capture of Brooklyn.

Of course it is highly important for the Pennsylvania Railroad to have a station in New York City for the accommodation of through passengers, but we have long held that such a station would not justify a bridge across the Hudson River or even a tunnel across the Hudson River. A central station on Manhattan Island at about the latitude of 33d Street will accommodate a small percentage of the passengers now delivered by the Pennsylvania Railroad on the western bank of the Hudson River. Immensely the greater part of these passengers go below 14th Street and we surmise that when these tunnels are built, and the grand central station, the bulk of the suburban traffic will still be delivered at the Jersey City station and distributed by ferry boats.

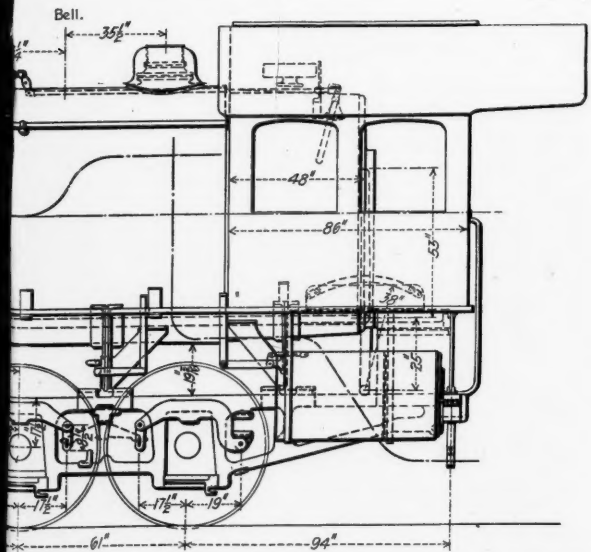
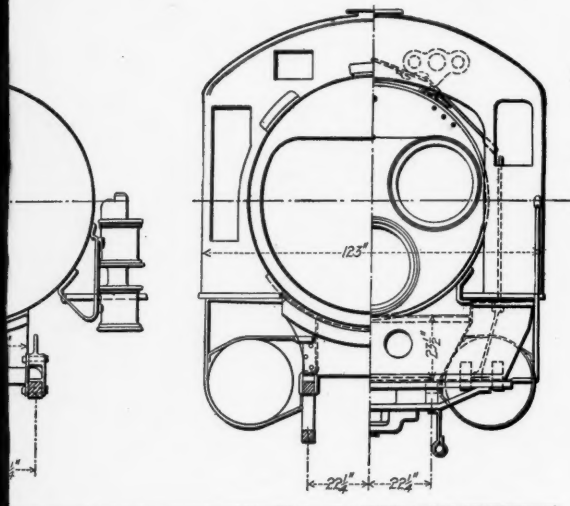
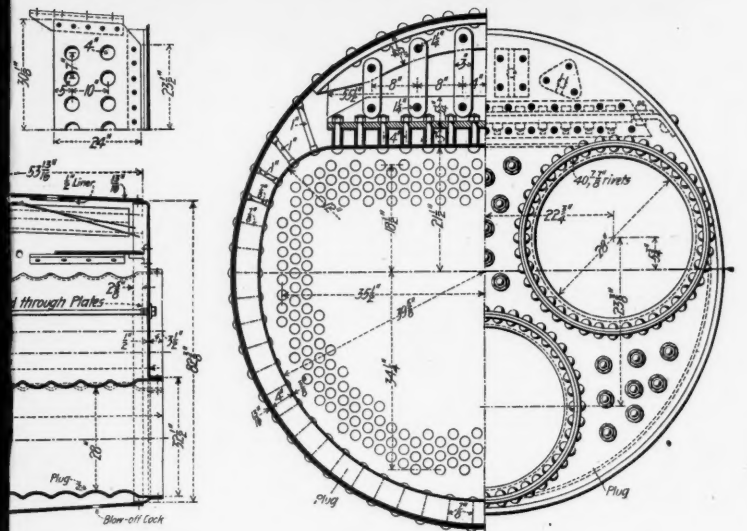
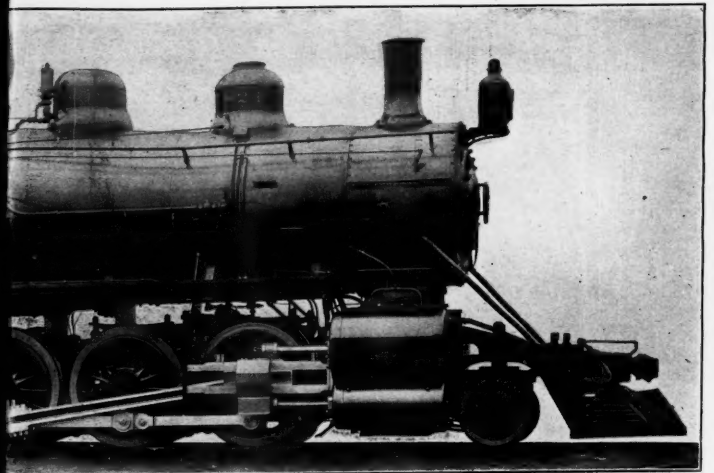
If this view of the matter is correct the error of a Hudson River bridge, with its stupendous cost, becomes apparent; but a connection by tunnel across the island with an incidental station or stations on the island is an entirely different matter. This connection will enable through passengers, destined for the West and Southwest, to take trains in the heart of New York City, just as they now do from the Grand Central Station. But it will do much more—it will enable Brooklyn people to take through trains for the West and Southwest at convenient stations in the city of Brooklyn; but still further, it will bring into the heart of New York City a great local traffic from Brooklyn and from Long Island which is now very inadequately accommodated. Thus, while the tunnel scheme with its connections, stations and terminals will cost very much less than a North River bridge with its connections and terminals (possibly one-tenth as much, at any rate, less than one-fourth as much), it will accomplish a great deal which the



THE PLAYER-BALDWIN COMPOUND CONSOLIDATION OIL-BURNING FREIGHT

MR. G. R. HENDERSON, Assistant Superintendent of Machinery.

Built by the BALDWIN LOCOMOTIVE WORKS. MR. S. M.



THE PLAYER-BALDWIN COMPOUND CONSOLIDATION OIL-BURNING FR
Built by the BALDWIN LOCOMOTIVE WORKS.

bridge project never could have accomplished. We take it that this settles the question of a North River bridge for a generation to come; further than that we need not try to look. The newspaper talk about other New Jersey railroads uniting with a bridge company to build a bridge into the city is improbable on its face.

It is fortunate that this question is now settled, for the possibility of a bridge across the river has held up important and much needed improvements. The Erie Railroad, for instance, is in great need of improved terminal facilities and such improvements were long ago projected but have recently been held back because of the possibility of a bridge. We should not be surprised now to learn at any time that trains from the Erie main line and from some of its tributary lines will be taken into the Jersey City station through a cut over the Bergen tunnel and by an elevated road. In the track elevation, which was recently carried out, piers to carry an overhead structure were built. It would follow, naturally, that passengers would be delivered in the Jersey City station at a higher level than now and that double-deck ferryboats would be put on the river. A still further improvement, and a logical sequence, would be foot bridges across the plaza, and across West Street, which would add immensely to the comfort of the great number of suburban passengers now using the Erie Railroad.

November Accidents.

We publish in another column of this issue a condensed record of the principal train accidents which occurred in the United States in the month of November. The record contains account of 50 collisions, 30 derailments, and 4 other accidents. Those which were most serious, or in which passengers were killed, or are of special interest by reason of their causes or attending circumstances, occurred as follows:

3rd, Watertown, Wis.	19th, Chicago, Ill.
4th, Bedford, Ind.	20th, Franconia, Ariz.
6th, Springfield, Mo.	20th, Walnut, Ill.
7th, Homestead, Pa.	27th, Seneca, Mich.
16th, St. Charles, Ill.	28th, Sparta, Wis.
17th, Culbertson, Mont.	

The cases in which passengers are reported killed are Seneca, St. Charles, Sparta and Chicago. The exact number killed at Seneca has not yet been reported; but the officers of the railroad company think that it will not be much over 25; six of these, one employee and five passengers, were on the eastbound train. The circumstances connected with this collision will call for further discussion when the official investigation is completed.

Franconia is the second most serious passenger train accident of the month, as will be seen by a perusal of the details; and yet only three passengers were injured in this collision, and these not very seriously. The value of strong car frames and of vestibules in a collision has been demonstrated many times before, but never more strikingly than in this case. A study in detail of the cause or causes of this collision would be of as much interest as the same study in connection with the Seneca collision, as the shock to the public caused by the news of the disaster, and the implied discredit of American methods of train management, were as great in one case as in the other; but the officer of the road to whom we wrote for details of the Franconia collision says simply that "the crew of the westbound train disobeyed orders," an explanation which, of course, does not explain. There is no railroad commissioner in Arizona.

The accident at Bedford, where 30 passengers are reported as injured in a collision which, it appears, may be classed as having been due to the absence of air-brakes on a passenger car, is of interest as showing how unreliable statistics may sometimes be. The safety of passengers on the railroads of the United States has been greatly enhanced by the introduction of air-brakes, and the common impression is that the use of air-brakes on passenger trains has long since become universal; but here is a case where the annual record of passengers injured is swelled by an accident to a passenger-carrying train which was not properly fitted with this safeguard. It is true that mixed trains have not yet entirely gone out of fashion anywhere, but in most cases the speed of such trains is supposed to be kept at a moderate rate, and it is not often that we have to record a large number of passengers injured on such a train. When a case does occur it ought to be made prominent enough to distinguish it from those where passengers are injured in trains which have the most complete equipment of safety appliances.

The remarkable fatality of the Culbertson collision may be attributed to the fact that a large number of men were carried in a car which was being pushed ahead of the engine, a proceeding which obviously makes the danger to the occupants of the car much greater than in a train made up in the ordinary way. There was another collision of the same kind at Donelson, Ind.; and the reader will recall one of the same character at Warren, Mass., in September.

The accident at Homestead, Pa., is the first one of the kind on record, so far as we recollect. It is of interest

chiefly to superintendents of roads which carry large masses of red hot liquid metal over lines traversed by passenger trains, and to people who live in houses at the foot of embankments along such lines.

The newspapers reported in November 23 electric-car accidents, in which four persons were killed and 43 injured. One of the derailments included in this list did not involve any passenger car; it was a work train, and one employee was killed.

According to a veracious newspaper in the Southwest, the Missouri Pacific is going to have its entire system inspected by a number of its passenger men; and everything that these gentlemen see will be criticised by them for the purpose of getting out better advertising matter, and bettering the service. There will be 17 or 18 men in the party. The report will cover all things connected with the road, the service, track, depots, eating houses, cafe cars, sleepers, day coaches, the scenery, natural advantages or disadvantages, watering places, summer and winter resorts "and in fact everything from the engineer's oil can to the broad prairies and stately mountains that line the route." This is the best scheme that we ever heard of. The inspection trips of the Pennsylvania, occupying a week or so, are child's play compared with this trip lasting a month, even though the Pennsylvania does take along a few civil and mechanical engineers. Not that passenger men are better or worse than operating or engineering officers; it is the broad range of subjects that makes this enterprise unique. When did anyone ever before hear of inspecting and criticising the mountains? Why, there are thousands of railroad mountains that have needed the critic's strictures these many years. Some of them ought to be made to move up nearer the line, so as to afford better views from the parlor car windows. We have long thought that a number of mountains, which we could name, ought to be rebuked for the heartless way in which they interfere with line and grade. This, however, is perhaps a branch of the subject that the passenger agent cannot bother himself with. Not the least of the valuable features of the forthcoming reports will be that which shows up the natural "disadvantages" of the road; this information will be of inestimable value to the passenger department, if the Missouri Pacific's passenger department is like that of most roads. Passenger departments usually rest for 365 days in the year in serene ignorance that there are any disadvantages. One G. P. A. once, in a fit of frankness, said that where his line ran for about 1,000 miles through the sage brush, with never a town in the whole distance, "the view from the car windows" (of his train) was "intensely dull;" but we have never heard of that G. P. A. since, and we think he died. He might just as well have been braver, however; and we trust that these M. P. men, when they encounter anything discouraging outside the cars, will make of the circumstance only an incentive to redouble their energies in describing the architects' and decorators' triumphs in the interiors. Long live the G. P. A.

Mr. Walker D. Hines, First Vice-President of the Louisville & Nashville, has issued a pamphlet on the President's message and the proposals to amend the Interstate Commerce Act. Mr. Hines' views on the Interstate Commerce Law are well known to our readers, and we shall therefore sufficiently indicate the character of the pamphlet when we say that it sets forth in his well known vigorous language the view that the Interstate Commerce Commission is disingenuously asking for additional and improper powers, when the real trouble is that it does not perform the duties prescribed in connection with the power which it now possesses—the duty to detect and punish secret rate cutting. Mr. Hines points out that the passage of the Cullom bill would not remove the temptation or lessen the facility for secret cutting. He objects to the proposition to repeal the clause punishing shippers who try to get secret concessions, for shippers are the very parties who really bring about the unlawful practices. Mr. Hines gives a copy of a bill which he thinks the Commission is going to lay before Congress, and shows how the power to make rates, embodied in the bill, is a legislative power, and, therefore, how the exercise of that power would be one which the courts could not review or correct so easily as has been claimed. Hence, the right of appeal which the bill accords to the railroads may prove to be of but little use. A provision of the bill limits the effect of a rate-order of the Commission to the term of one year. It also abolishes imprisonment of officers and agents, and permits rate agreements and pools.

The number of employees on the 2,523 miles of the Belgian State Railroads in 1899 was 59,226 = 23.45 per mile of road, against 4.95 in this country. The traffic is much denser there than here, but the number of miles run by trains per man employed was 595 in Belgium, against 928 in this country. The Belgian passenger train carried on the average 90 per cent. more passengers than the American; but the American freight trains carried 70 per cent. more freight than the Belgian. The short hauls in the little country account for a part of the difference.

NEW PUBLICATIONS.

Master Car and Locomotive Painters' Association.—The Proceedings of the Thirty-Second Annual Convention of the Master Car and Locomotive Painters' Association, held at Buffalo, last September, is now issued in an octavo volume of 150 pages with index. It may be had from the *Railroad Digest*, New York City, or from the Secretary and Treasurer, Robert McKeon, Erie Railroad, Kent, Ohio.

Society for the Promotion of Engineering Education.—The Proceedings of the Ninth Annual Meeting of the Society for the Promotion of Engineering Education, held in Buffalo last summer, now appear in an octavo volume of 384 pages, with an index. The volume is edited by a committee consisting of Professors Marvin, Fletcher and Jacoby, and it may be had for \$2.50 (\$2 to libraries). It bears the imprint of the Engineering News Publishing Company, 220 Broadway, New York, and can doubtless be procured through that house. The volume contains list of officers, committees, and members, constitution and rules, and the report of the Proceedings of the meeting.

Theoretical Elements of Electrical Engineering. By Charles Proteus Steinmetz. Large 8vo.; 238 pages; diagrams; index. New York: The Electrical World & Engineer.

In this excellent and thoroughgoing work the average reader will find the theoretical treatment of the subject developed to an extent that will tax his ability to follow the author unless he is a fair mathematician. This is more particularly true of Part I, General Theory; but the author's commendable practice of following each exposition of theory by one or more concrete examples lures the reader on to continued effort. Even so, the beginner could hardly keep pace with the author's very condensed statements of elementary principles unless he had the aid of a lecturer or of a more elementary treatise. But, assuming a reasonable equipment of mathematics, and some command of the elements of the art, the reader will find this work remarkably satisfactory in its clearness, compactness and systematic development.

Part II treats of Special Apparatus, such as the various forms of generators, motors, transformers, converters, etc., in connection with the use of both direct and alternating current. The classification of apparatus is under the headings recommended by the Standardizing Committee of the American Institute of Electrical Engineers. This part is descriptive, with diagrams showing the characteristics of the performance of the different apparatus, and with illustrations of the several windings. A serious study of this part of the work cannot fail to fix in the mind a clear idea of the essential features and relative characteristics of different types of electrical apparatus, and to dispel the lingering mental confusion which follows the reading of more diffuse, less systematic, and "easier" books. Mr. Steinmetz is not easy reading, but he is robust.

TRADE CATALOGUES.

The B. F. Sturtevant Co., Jamaica Plain Station, Boston, Mass., has issued a little 12-page pamphlet entitled "Sturtevant Forges."

The Inductor Type of Generator, by Erward Heitmann, has been reprinted in pamphlet form, with illustrations, making bulletin No. 123 of the S. K. C. System. It may be had by addressing the Stanley Electric Manufacturing Company, Pittsfield, Mass.

Water and Gas Works Appliances and Pumping Machinery.—Messrs. R. D. Wood & Co., Philadelphia, have issued a new catalogue of water and gas works appliances and pumping machinery. It is a quarto volume of 176 pages, with index. It contains illustrations and descriptions of apparatus, useful tables, and much special information.

Triplex Power Pumps.—The Deane Steam Pump Co., Holyoke, Mass., have issued their Catalogue No. 5, with the above title. There are 72 pages, 5½ x 9 in., more than half of which contain good illustrations of pumps, complete and in detail. The illustrations practically cover the field of pumping operations, many heavy-duty pumps as well as small ones being shown.

Gas and Gasoline Engines.—The National Meter Company, 84 and 86 Chambers street, New York City (318 Dearborn street, Chicago; 109 Franklin street, Boston; Saracen Chambers, Snow Hill, London, E. C.) sent out a catalogue showing Nash gas and gasoline engines. The pamphlet illustrates some leading application of single, double, and three-cylinder engines. It contains tables of standard sizes, figures of cost of operation, and other information.

Producer Gas.—Messrs. R. D. Wood & Co., of Philadelphia, announce that they have made arrangements for the "Mond Gas" apparatus, making producer gas from bituminous slack or coal, and recovering a sufficient amount of ammonia and tar to yield a substantial sum to be credited against the cost of the coal. A ton of coal in the Mond apparatus gives the same quantity of gas and of the same heat value as in ordinary producer practice. Under favorable conditions with gas engines of large power using Mond gas one cent a day will cover the fuel cost for 1 h.p.

TECHNICAL.

Manufacturing and Business.

The Galena Oil Co. and Signal Oil Co., of Franklin, Pa., have decided to consolidate, and after Jan. 1, 1902, will be known as the Galena-Signal Oil Co. These companies are identified with the Standard Oil Co.

Pawling & Harnischfeger, Milwaukee, Wis., within the last 30 days have taken orders for electric traveling cranes and electric hoists having an aggregate lifting capacity of 513 tons. Among the railroads using their apparatus are the C. & N. W.; C. M. & St. P.; C. B. & Q., and Pennsylvania.

S. D. Anderson, who, for the past seven years, has represented C. B. Hutchins & Sons, of Detroit, resigned Nov. 15 to take service with the Standard Railway Equipment Co., of St. Louis, Mo. Mr. Anderson's headquarters will be 643 Bourse Building, Philadelphia, Pa.

The Star Brass Co.'s muffled and open pop safety valves and steam gages are specified for 10 locomotives now building at the Baldwin Locomotive Works for the Cincinnati, New Orleans & Texas Pacific.

According to a cable from London, Lemuel Bannister, for the past five years General Manager of the British Westinghouse Co., has resigned his position in all the Westinghouse companies and will retire from active work.

W. C. Ennis, foreman of Delaware & Hudson locomotive shops, has resigned his position with the company, and goes to Paterson, N. J., where he has accepted a position with the Cooke Locomotive Company.

The Standard Coupler Co., 160 Broadway, New York, has declared the regular 4 per cent. semi-annual dividend on its preferred stock, and a dividend of 1 per cent. on its common stock, payable Dec. 31. The transfer books will be closed from Dec. 21, 1901, until Jan. 15, 1902.

The New York office of the American Car & Foundry Co., after Dec. 16, will be in the Broad-Exchange Building, corner of Broad street and Exchange Place, New York. The new telephone number is 1792 Broad.

Iron and Steel.

The Westinghouse Foundry Company has applied for a charter in Pennsylvania. The incorporators are George Westinghouse, George C. Smith, H. Herman Westinghouse, Wm. Scott and W. D. Updegraff. The company is about to build a foundry at Stewart Station, on the Pennsylvania Railroad, some 25 miles south of Pittsburgh. The site for the foundry is on about 650 acres at Trafford Park, a new town.

The Mechanical Engineering Department of the Republic Iron & Steel Co. has been opened with Willis McKee in charge. Heretofore S. V. Huber & Co., of Pittsburgh, have had charge of the engineering for the company and will be retained as consulting engineer.

Richard Corcoran, of Albion, Mich., has become General Manager and Superintendent of the Port Huron Malleable Co., recently organized to build a malleable iron foundry at Port Huron, Mich.

Frank Ryman has resigned as General Superintendent of the Olive Iron & Steel Co., to become President of the New Castle (Pa.) Forge & Bolt Co.

The Page Woven Wire Fence Co. filed articles of incorporation in New Jersey, on Dec. 11. The capital stock will be \$6,000,000. The heretofore existing Page Company will be the basis of a new corporation which, it is said, will absorb several independent wire fence making concerns.

President Henry M. Whitney has sold his controlling interest in the Dominion Iron & Steel Co., to James Ross, of Montreal. Mr. Ross will assume executive control of the company's works at Sydney at once.

The Vogler Sheet Metal Mfg. Co. was incorporated in Missouri last week by Adolph Vogler, Henry Goldsmith, Leo S. Rassieur and others.

The Parkersburg Iron & Steel Co., of Parkersburg, W. Va., has recently placed four sheet mills in operation and will start two other mills as soon as they are finished. The company is considering installing several knobbling fires and puddling furnaces to make puddled iron sheets and charcoal iron sheets.

According to statistics compiled by *Iron Age* there were, on Dec. 1, 241 coke and anthracite stacks in operation, with a weekly capacity of 317,358 gross tons, which is an increase of 3,583 tons, as compared with Nov. 1. In November stocks declined 42,000 tons. Counting in the anthracite furnaces, the annual rate of production at the present time is 16,850,000 tons, as compared with the maximum record of 13,789,000 tons in 1900.

The Alice blast furnace at Sharpsville, Pa., has been sold to the Youngstown Iron, Sheet & Tube Co. for \$350,000. President G. D. Wick, of the Youngstown company, will recommend to the directors and stockholders that the capital stock of the company be increased from \$2,000,000 to \$4,000,000, and in addition will recommend a bond issue of \$1,000,000.

Capitalists of Cleveland, Ohio, have applied for a charter in Pennsylvania for the Alliance Machine Co., to make machinery at a plant to be built in Alliance, Ohio. The capital stock will be \$200,000.

The Philippine Government is arranging to build 21 small gunboats for service among the islands, and has asked the Bureau of Construction, Navy Department, to supply sets of plans for them. Rear Admiral Bowles, Chief Constructor of the Navy, is in favor of building these vessels in the United States, as the better and

more economical course, but it is not decided whether this will be done, or whether they will be built at some point in China or Japan.

The Tennessee Coal, Iron & Railroad Company announces the completion of its rail mill at Ensley, and General Manager Charles McCreery states that the plant will be in operation within a few weeks.

James Milholland, President of the J. & J. B. Milholland Engine Building Company, Pittsburgh, Pa., died at his home in Pittsburgh on Dec. 16, aged 64.

Scripture's Color Sense Tester.

Dr. E. W. Scripture, of Yale University, has designed an improved form of his apparatus for making tests for the detection of color blindness and defective vision, and the new form has been awarded the Edwin Longstreet Medal by the Franklin Institute of Philadelphia. It also was included in an exhibit at the Pan-American Exposition which received a bronze medal. The apparatus, as made two years ago, was illustrated and described in the *Railroad Gazette* of March 23, 1900. In the improved form there are four movable disks, with more holes than in the old form, so that it is possible to show the different colors and shades in a thousand different combinations. One disk has openings filled with glass of 10 different degrees of smokiness. Dr. Scripture feels sure that his apparatus is now thoroughly perfected so that it alone is sufficient to make a reliable test. He has with this instrument caught a number of men who had passed the wool test, but he has never found any indication of color blindness in a person who had passed the test with his apparatus.

Chilled Wheels for 100,000 lbs. Capacity Cars.

The New York Car Wheel Works, Buffalo, N. Y., tells us that their "Special" chilled wheel has been specified for use on 1,000 cars of 100,000 lbs. capacity recently ordered by the Bessemer & Lake Erie from the Pressed Steel Car Co. Two previous lots of cars of this class were fitted with these wheels, and there are now in use on that road 20,000 of these wheels, half of which have been in continuous service since 1897, none having been removed for crack or breakage of any kind.

Oil Fuel.

By invitation of Sir Marcus Samuel and the managers of the Shell Transport & Trading Company, Limited, a large number of shipowners and marine engineers lately visited the steamer "Clam" prior to her departure from the Thames for Philadelphia. The object of the inspection was to demonstrate the success of liquid fuel, and the logs were produced to show that for two years the steamer had been achieving far better results with oil than had previously been possible with the best Welsh coal. It was stated that in actual experience 18 tons of oil gave more heat than 28 tons of coal, and Sir Marcus Samuel said that the proportion would be much greater in favor of oil now that means had been devised for removing water from the product. The "Clam" has for two years relied solely upon Borneo oil, and her experience has been such as to induce the Shell Company to send a fleet of 18 steamers to sea burning the same kind of fuel. The company claim that from their fields in Borneo they can supply 100,000 tons of oil a day, but the opening of new resources in Texas will enable them to meet the requirements of the whole western hemisphere.

American Palace Car Co.

The American Palace Car Company, of New York City, was incorporated Dec. 14, with a capital of \$5,000,000. The Directors are: Joseph H. Hoadley, Wm. J. Arkell, Daniel S. Brown, Le Roy W. Baldwin, Henry K. Davis, and George E. Bouchie, of New York City; George A. Denham, of Boston, Mass.; Henry W. Burget, of Brookline, Mass.; W. S. P. Melvin, of East Orange, N. J.; Prescott A. Sherer, of Brooklyn, and George H. Worthington, of Cleveland, Ohio. The company is not in opposition to the Pullman Company. It will make a car which can be transformed into a chair car by day and into a sleeper by night.

Cleaning Passenger Car Trucks.

The Southern Pacific method of cleaning passenger car trucks as practiced at West Oakland, Cal., is of general interest. Instead of putting oil on the trucks by hand, the oil is applied with a paint atomizer, so that it reaches all the corners. Then a man follows up with waste, and wipes the trucks, making them look almost as if they were newly painted. The oil used is two parts coal oil and three parts Coalina and crude oil. So far as can be observed the varnish and paint is not injured by this treatment. The use of the atomizer hastens the work so that two capable men in this way do as much cleaning as four or five men working in the usual manner; the cleaning is also said to be better done where the atomizer is used. This method was started on the Southern Pacific by Mr. F. L. Burt, Foreman of the passenger yard at West Oakland.

Standard Steel Car Company.

An application for a charter for the Standard Steel Car Co. will be made in Pennsylvania on Jan. 2, with a capital stock of \$2,000,000. J. M. Hansen, Chief Engineer of the Pressed Steel Car Co., is one of the incorporators and will be President of the new company. The other incorporators named are H. J. Gearhart, for some time Auditor of the Pressed Steel Car Co., and recently Manager, and Peter F. McCool. These men will sever their connection with the Pressed Steel Car Co. on Jan. 1. Several sites for a plant are under consideration. It will probably be located in the Pittsburgh District and be ready for operation by July, 1902.

Changes in the Pittsburgh Coal Co.

On Jan. 1 Frank M. Osborne, President of the Pittsburgh Coal Co., and Charles W. Baine, Secretary and Auditor, both of Cleveland, Ohio, will resign. At the September meeting of the Board of Directors Upson A. Andrews, Treasurer, resigned, and that office has been vacant since, the duties being performed by John Shaw, Assistant Treasurer. These vacancies will be filled at the January meeting of the Board.

To Make Engines.

The Bradley Mfg. Co. has been organized by C. H. Bradley, Jr., of Pittsburgh, Pa., and Daniel J. Geary, of Oil City, to build a steam engine and pump works in Allegheny. The plans for the works provide for structural steel construction. The capital stock will be about \$1,000,000.

Improvements in Steel Corporation Plants.

The Advisory Board of the United States Steel Corporation is considering a number of improvements and enlargements to the properties of the subsidiary companies during the coming year. First of all the steel producing capacity of the corporation will be increased, inasmuch as the output of finished material is far in advance of that of the Bessemer converters and open-hearth plants. Furthermore the United States Steel Corporation, or rather a number of its constituent companies, such as the Carnegie and National Steel companies, have contracts with various independent companies to supply them with billets, sheet and tin plate bars, and in many instances these contracts have several years yet to run. It has been practically decided that the bulk of the improvements will hereafter be made in Pittsburgh, Wheeling, Youngstown, the Cleveland district and Chicago. The corporation's greatest properties are in these territories and in furtherance of the plan of centralization already decided upon these districts will be constantly developed.

One of the plans suggested to the advisory board to increase the steel output is so to equip all the open-hearth furnaces of the Carnegie Steel Co., at Duquesne, that the steel may be made by the Monell process, which has already proved successful at Homestead.

Additional mills for the rolling of heavier gages will shortly be installed at a number of the plants of the American Sheet Steel Co.

At Youngstown, Ohio, the district management has suggested the erection of a fourth 600-ton blast furnace.

The American Tin Plate Co. will in the near future install machinery for the rolling of black plate for tin mills that will be largely automatic.

New Dry Dock Company.

The Union Construction & Dry Dock Company has been incorporated in Virginia with a capital of \$25,000. D. D. Hitchings is President, J. E. Davis Vice-President, and Charles T. Dean, of Ironton, Ohio, Secretary and Treasurer. These, with R. A. Hutchings, of Portsmouth, Va.; W. S. Bowden and Wilson Reed, of Norfolk, and J. S. Ward, of Baltimore, are the Directors. The principal office will be at Norfolk. The plant, it is announced, will be located on the southern branch of the Elizabeth River.

The Isthmian Canal.

The treaty with Great Britain, opening the way for building a canal across the Isthmus, was confirmed by the United States Senate, Dec. 16, by a vote of 72 to 6. The essentials of this treaty were printed in the *Railroad Gazette* of Dec. 13, p. 859.

The House Committee on Interstate and Foreign Commerce has reported favorably the Hepburn bill providing for the construction of the Nicaragua canal. This bill carries a present appropriation of \$10,000,000 and authorizes an aggregate appropriation of \$180,000,000.

In the Senate, Mr. Morgan introduced, on Dec. 10, a bill for the construction of the Nicaragua Canal. This bill provides for a fund not to exceed \$180,000,000 and makes a present appropriation of \$5,000,000. It provides for a Canal Board to consist of the Secretary of War, who shall be its President, and eight other citizens of the United States to be appointed by the President of the United States. The term of office is for five years. The members of the Board to receive \$8,000 a year. It provides that the Chief Justice of the United States, the Secretary of State, and the Secretary of War shall be a board to prepare regulations for the police government of the canal belt. It provides further that the President may designate officers of the army or navy, active or on the retired list, for professional duty as engineers or inspectors.

Alcohol for Car Lighting.

The Bavarian State Railroads report that their experiments with alcohol as an illuminant (with lamps having something like a Welsbach gas burner) have been entirely successful so far as the illumination is concerned. But it is indispensable that the lamps should be kept clean and carefully and cautiously handled; and the change of the asbestos mantles at the proper time and keeping them in order are of great importance. The officials are instructed to give special instruction and supervision to the men who care for and use these lamps. The chief object in introducing alcohol as an illuminant seems to be to increase the market for the product of the distilleries.

The American Jessop Steel Plant.

Sydney J. Robinson, managing director of Wm. Jessop & Sons, the English firm which is building a plant at Washington, Pa., before sailing for Europe, said: The Jessop Steel Co., of Washington, Pa., composed of \$250,000 of British-American capital, has been incorporated

under the laws of Pennsylvania. The directors are William Jessop, Herbert Hughes, W. F. Wagner, the general manager of the New York offices of the British company; E. L. Hand, of Philadelphia, Pa.; C. N. Brady, of Washington, Pa., and S. J. Robinson. The officers will be William Jessop, President; S. J. Robinson, Vice-President, and James Jessop, Secretary and Treasurer.

The initial plant will consist of three main buildings: A crucible melting shop, 225 ft. x 110 ft. wide; rolling mill plant, 275 ft. long x 110 ft. wide, and a power house, 100 ft. long x 60 ft. wide. Sheet steel will be made, but no bars. A large portion of the ore will be imported from Sweden.

The works will be designed by James J. Mahon, of Chicago, through whom the contracts for building and equipment are being given out. The grading and foundations are being done by C. J. McDonald & Son, of Pittsburgh, Pa. The contract for the buildings has been given to Gustav Kaufman, No. 1 Broadway, New York. The rolling mill machinery will be supplied by the G. A. Hogg Company, of Pittsburgh. The engines, one 28x72, another 24x60, will be built by the Lane & Bodley Company, of Cincinnati, O., and the water-tube boilers will be made by the Babcock & Wilcox Company, of New York. Contracts for machine tools, cranes, etc., have not yet been placed.

Pneumatic Tool Consolidation.

The plan for consolidating the various pneumatic tool companies into one company is reported as progressing favorably. The capital stock will be \$10,000,000, of which \$7,000,000 will be issued. The Chicago Pneumatic Tool Co. will be the nucleus of the consolidation, the other companies being the Boyer Machine Co., Detroit; the Franklin Air Compressor Co., Franklin, Pa.; the New York Air Compressor Company; the Chisholm-Moore Co., Cleveland (in so far as it appertains to the business of pneumatic tools), and the Taite-Howard Pneumatic Tool Co., Ltd., of London, Eng.

Pneumatic Railway Signal Company.

A special meeting of the shareholders of the Pneumatic Railway Signal Company was held at Rochester, Monday afternoon. Nearly all of the stock was represented. It was voted to increase the capital stock of the company from \$1,250,000 to \$3,000,000. Authority was given to the directors to buy the stock of one or more corporations; also to buy such other property as may be useful in the business of the company; and to issue as much of the increase of stock as may be found necessary in carrying out these transactions. Authority was given to sell all or any part of the company's property. Of course, all of this is merely preparation for some important combinations which are now under negotiation. Immediately after this meeting a meeting was held of the shareholders of the International Pneumatic Railway Signal Company, at which the necessary powers were given to enable the board to carry out the combinations under consideration.

Tank Cars Wanted in Texas.

The oil tank car shortage in Texas is retarding the use of Beaumont oil for fuel by manufacturers of that State. Many of the manufacturing concerns which equipped their plants for burning oil, have been forced to go back to the use of coal temporarily owing to the failure of the oil producers to get the cars in which to ship the oil. The Texas Railroad Commission has been informed by the several railroad companies operating roads in Texas that orders have been placed for about 2,000 tank cars, all of which will be employed to supply the Texas trade. The delivery of these cars is promised early in the coming year.

Electric Machinery for the London Underground.

Mr. Charles T. Yerkes has awarded the contract for the electrical equipment of the London underground railroads (Metropolitan and District), to the British Westinghouse Electric & Mfg. Co., Ltd., whose works at Manchester, England, will soon be in operation. The contract includes four generators of 5,000 k. w. capacity each. These generators will be the same size as the alternators now being erected for the Manhattan Railway, New York City, and the latter are the largest generators made. The Yerkes generators will supply alternating current for transmission through high tension cables. The work of changing over the tunnels from steam to electric power will begin immediately, and it is expected that it will be completed within two years from January 1. A portion of the machinery will be built at Pittsburgh, until the Westinghouse works at Manchester are in operation.

THE SCRAP HEAP.

Notes.

On the Northern Pacific telephones and Morse telegraph instruments are now being used simultaneously on the same line, by means of an arrangement devised by Mr. C. H. Gaunt, Assistant Superintendent of Telegraph.

It is given out that the Philadelphia & Reading will, after June 1 next, pay a pension, equal to half salary, to employees who have been in the company for 50 years and who wish to retire: the minimum pension to be \$30 a month. With this age limit it does not look as though the pension roll would ever be a great burden on the treasury of the company.

Traffic Notes.

The half fare permits to be issued to clergymen by the Central Passenger Association next year will be made

up in books, and the book must be shown to the ticket agent when a permit is presented.

The Railroad Commissioners of California have again held a hearing on the matter of rates for the transportation of crude petroleum from the San Joaquin Valley to San Francisco, and have ordered a further reduction of rates including a reduction in the charge from the oil wells to Bakersville which appears to be over a track built specially for this service.

The latest traffic war reported is one between the Midland Terminal and the Colorado Springs & Cripple Creek District on passenger fares from the Colorado Springs to Cripple Creek. The regular rate of \$2.50 having been reduced to 25 cents it is said that the first named road is selling round-trip tickets, good for 25 days, for 40 cents; and freight is down to 5 cents per 100 lbs.

The roads from Chicago to St. Paul, and to Omaha, have reached a settlement of the dispute as to the time of passenger trains which has been going on for several weeks past. The stronger roads between Chicago and St. Paul have been carrying passengers on their fast mail trains, two or three hours quicker than the regular passenger trains; and this, of course, not only irritated the weaker lines, but also caused uneasiness in regard to the time between Chicago and Omaha, the three roads having lines to both of these cities. By the agreement now reached the fastest passenger train time between Chicago and Omaha will be 13 hours, 30 minutes; between Chicago and St. Paul, 12 hours, 55 minutes.

I. C. C. Decision on Interstate Commerce Commission Classification of Fur Scraps.

The Interstate Commerce Commission, in an opinion by Commissioner Prouty, has announced its decision in the case of Myer vs. C. C. & St. L. Ry. and others. The decision is in favor of the complainant. The Commission holds that in determining what freight rate shall be borne by different commodities an attempt should be made to maintain a fair relation between those commodities, and a classification which utterly ignores all considerations of this kind is unjust and unreasonable. In this case hatters' furs and fur scraps and cuttings, which are classified as double first class in the "Official Classification," are found to be fully as desirable for traffic purposes as commodities named in the first class; comparing hatters' furs, etc., with articles taking first class rates, including hats, the finished product for which these commodities constitute raw material, the Commission holds that the furs, etc., cannot lawfully be classed higher than first class.

The Mount Holly Electric Service Stopped by the Pennsylvania.

The Pennsylvania R. R. Co. has given notice of the permanent abandonment of the electric service between Mount Holly and Burlington, N. J. The line was equipped with electricity as an experiment and has never proved a success since it was first opened in June, 1895. The recent burning of the power house has hastened the company's decision.

A Large Movable Dam.

A movable dam will be built near Sterling, Ill., across Rock River to supply the Hennepin canal feeder, which runs 29 miles to Sheffield, Ill., where it joins the main line. The dam designed by Capt. L. L. Wheeler will form a lake one mile wide and seven miles long, half the distance from Dixon to Sterling. It will be a movable structure with 1,184 gates, which can be taken out and stored for the winter, leaving only a bridge in its place. It will cost \$88,015. The dam will be 1,350 ft. long. Seven concrete piers, each 8 ft. thick and 27 ft. wide, 156 ft. apart, will support a trussed bridge. In the bridge there will be 37 gate spaces to each span, and in each of these will be four gates.

New Army and Navy Buildings.

The Secretary of War has sent to Congress estimates of \$1,200,000 to cover improvements at Washington Barracks, Washington, D. C., and an appropriation of that amount is asked. The Secretary also asks an appropriation of \$1,500,000 to be immediately available for barracks in the Philippines. The Navy Department has let a contract to Noel & Thomas, of Baltimore, Md., for the new Naval Academy buildings, at their bid of \$2,418,000, which was the lowest of the four bids submitted.

LOCOMOTIVE BUILDING.

The Lehigh Valley has ordered 40 locomotives from the Baldwin Locomotive Works.

The Hilo (Hawaii) R. R. is having one locomotive built by the Baldwin Locomotive Works.

The Quebec Central is having two locomotives built by the American Locomotive Co.

The Missouri, Kansas & Texas has ordered 23 locomotives from the Baldwin Locomotive Works.

The Ann Arbor is having two locomotives built at the Manchester Works of the American Locomotive Co.

The Terminal R. R. Association of St. Louis is having one locomotive built by the Baldwin Locomotive Works.

The Atchison, Topeka & Santa Fe has reserved space at the Baldwin Locomotive Works for 70 more locomotives.

The Cincinnati, New Orleans & Texas Pacific has ordered 13 locomotives from the Baldwin Locomotive Works.

The Michigan Central has ordered nine more locomotives from the American Locomotive Co., to be built at Schenectady.

The Baldwin Locomotive Works are reported to have an order for two 35-ton narrow gage locomotives for a railroad to be built in Chili.

The Union Pacific and Southern Pacific, we learn from a source usually authentic, have reserved space at the Baldwin Locomotive Works for 250 locomotives, to be built during 1902.

The Northern Pacific has ordered 50 locomotives from the American Locomotive Co., and 50 from the Baldwin Locomotive Works, and has reserved space for 50 additional at the last named works.

The Choctaw, Oklahoma & Gulf has ordered 50 locomotives from the Baldwin Locomotive Works for 1902 delivery. The order includes 30 consolidation Vauclain compound, 10 8-wheel passenger and 10 switching engines.

The Baltimore & Ohio has placed the following orders: With the American Locomotive Company, 48 consolidation locomotives, to weigh 193,000 lbs. each; with Baldwin Locomotive Works, two switching engines, to weigh 100,000 lbs. each.

The Republic & Grand Forks, British Columbia, has placed an order with F. M. Hicks for a passenger engine 17 x 24 in., eight wheels, 56-in. wheel centers, Monitor injectors, Nathan lubricator, air sander, air bell ringer and 3,500 gal. tank.

The Illinois Central order placed with the Rogers Locomotive Works, and reported in our issue of Dec. 13, calls for the following: Twenty consolidation and four Prairie type locomotives, all for July, 1902, delivery. The consolidation engines will weigh 175,000 lbs., with 154,000 lbs. on the driving wheels, and have 20 x 28-in. cylinders, 56½-in. drivers and extended wagon top boilers, with a working steam pressure of 200 lbs., 336 tubes, 2 in. in diam., 14 ft. 7 in. long, with fire-box 108 in. long and 72 in. wide, tender capacity for 7,000 gals. of water, 16 tons of coal. The Prairie type engines will weigh 175,000 lbs. and 130,000 lbs. on the drivers, and have 20 x 28-in. cylinders, with 75-in. driving wheels, extended wagon top boilers, with a working steam pressure of 200 lbs., 336 tubes 2 in. in diam., and 19 ft. wide, fire-box 102 in. long and 72 in. wide, tender capacity for 7,000 gals. of water and 16 tons of coal. The specifications for all include Westinghouse air-brakes, Taylor axles, Westinghouse friction draft gear, Ohio and Nathan injectors, U. S. Metallic packing, Ashton safety valve, Leach double sanding devices, Nathan sight feed lubricators, A. French Company's springs, Ashton steam gages, and Gold steam heating system.

CAR BUILDING.

The Southern Pacific has ordered 18 dining cars from the Pullman Co.

The Chicago Junction is having 150 freight cars built by Haskell & Barker.

The Sharon Steel Co. is having five freight cars built by the Pressed Steel Car Co.

The Northern Pacific has ordered 300 ballast cars from the American Car & Foundry Co.

The Guayaquil & Quito has ordered 12 hand cars from the American Car & Foundry Co.

The Texas & Pacific is having 2,500 freight cars built by the American Car & Foundry Co.

The Missouri Pacific has ordered 1,000 stock cars from the American Car & Foundry Co.

The Mather Stock Car Co. is having 50 freight cars built by the South Baltimore Car Works.

The Chicago Great Western is having 20 freight cars built by the American Car & Foundry Co.

The American Car & Foundry Co. is building about 100 cars of various sorts, for different parties.

The Chicago, Milwaukee & St. Paul will build 400 furniture cars of large capacity at its own shops.

The Baltimore & Ohio has ordered 1,300 box, and 700 flat cars from the American Car & Foundry Co.

The Indiana, Illinois & Iowa has ordered six more cabooses, in addition to the six reported last week.

The Philadelphia & Reading has ordered 200 freight cars of 18,000 lbs. capacity from the Middletown Car Works.

The New York, Ontario & Western has ordered 500 coal cars of 80,000 lbs. capacity from the American Car & Foundry Co.

The Great Northern has ordered 42 cars for passenger service from the Barney & Smith Co., and 18 from the American Car & Foundry Co.

The Atchison, Topeka & Santa Fe is reported to have ordered 1,000 cars from the Pullman Co., and 4,250 from the American Car & Foundry Co.

The Central of New Jersey has ordered from the American Car & Foundry Co. 750 hopper, 500 gondola, and 60 refrigerator cars, in addition to last week's order.

The Norfolk & Western, on the completion of the present work in its Roanoke shops next summer, expects to build 1,000 more 80,000 lbs. capacity coal cars there.

The Allison Mfg. Co., Philadelphia, is reported to have an order for 30 freight cars 28 ft. long, 5½ ft. wide and 3 ft. 6 in. gage, for a new railroad 21 miles long, to be built in Chili.

The Rodger Ballast Car Co. has received an order from the St. Louis Valley Ry. for 40 convertible ballast gondola and coal cars, 34 ft. long and of 80,000 lbs. capacity, to be equipped with air and M. C. B. couplers. They are for March, 1902, delivery.

The Republic & Grand Forks, British Columbia, has placed an order with F. M. Hicks, of the Hicks Locomotive & Car Works, Chicago, for two coaches, one a passenger and the other combination. These are finished in Pullman colors, interior of oak, Hale & Kilbourne 26-in. high-back, walk-over seats, steel platforms, and Pantasote curtains.

The Baltimore & Ohio has placed the following orders: With Harlan & Hollingsworth Co., 25 passenger cars and one combination passenger and baggage car; with the Pullman Co., 11 60-ft. baggage cars and one 60-ft. baggage and mail car; with the Pressed Steel Car Co., 3,000 steel hopper cars of 100,000 lbs. capacity; with American Car & Foundry Co., 1,300 box cars of 100,000 lbs. capacity with steel underframes, and 700 40-ft. flat cars of 100,000 lbs. capacity, with steel underframes.

The New York, Chicago & St. Louis order with the American Car & Foundry Co., reported in our issue of Dec. 13, calls for 1,000 box cars of 60,000 lbs. capacity. The cars will weigh 32,300 lbs. and measure 34 ft. ¼ in. long, 8 ft. 2¼ in. wide and 7 ft. 8¾ in. high, all inside measurements. The special equipment includes Simplex bolsters, Diamond brake-beams, Congdon brake-shoes, Westinghouse air-brakes, Magnus brasses, Gould couplers, Security doors, Gould draft rigging, Sherwin-Williams paint, Hutchins and Winslow roofs and A. French Spring Company's springs.

BRIDGE BUILDING.

BALDWIN, IOWA.—E. J. Cain, County Auditor at Maquoketa, will receive bids soon for a 120-ft. truss bridge over Maquoketa River.

BEATTYVILLE, KY.—The contract will be let Jan. 6 for a 381-ft. bridge. H. L. Wheeler, Commissioner.

CHARLES CITY, IOWA.—The Board of Supervisors has adopted a resolution to build a second bridge across the Cedar River. It will be at the foot of Milwaukee street and will cost about \$15,000.

CHESTER, S. C.—Bids will be wanted in January by J. R. Ervin, Lincolnton, N. C., with plans and speci-

cations, for a 350-ft. Pratt through bridge over the Catowba River for the South Atlantic Construction Co., which is building the Carolina & Northwestern.

CHICAGO, ILL.—The report that a footbridge will be built over the Fort Wayne tracks at 102nd street is incorrect. There is, however, a footbridge proposed over the Baltimore & Ohio yard and the Illinois Central tracks at Eighty-eighth street.

CINCINNATI, OHIO.—Bids are wanted, Dec. 30, for a plate girder bridge at Marshall avenue. George F. Holmes, Clerk of the Board of Public Service.

CLINTON, IOWA.—A bridge, according to report, will be built from the Iowa shore to Offerman's Island, next season. A street railroad is also proposed to run to the island over the new bridge.

The Chicago & North Western is reported preparing to build its proposed bridge over the Mississippi River at Clinton. (Construction Supplement, Oct. 11, 1901.)

COLUMBUS, OHIO.—Preliminary survey for a map and profile has been begun by the City Engineering Department for the proposed viaduct on Cleveland avenue. Julian Griggs, Chief Engineer.

DECATUR, ILL.—Regarding the report that a viaduct will be built over the Wabash tracks at West Main street, we are told that it has been under consideration, but probably nothing will come of it.

DECORAH, IOWA.—The Board of Supervisors will receive bids until 1 p. m., Jan. 1, at the office of F. A. Masters, County Auditor, for all steel bridges between 20 and 60 ft. long as may be ordered for the year 1902, plans and specifications to accompany bids.

DES MOINES, IOWA.—The Board of Public Works received bids for a Melan arch bridge on North Sixth avenue, and also bids for a bridge across the Des Moines River at the foot of East Sixth street. The Capital City Brick & Pipe Company got the contract for the Melan arch bridge, and Magden & Sheeley, of Des Moines, the East Sixth street bridge contract. The bids were as follows:

Sixth Avenue Melan Arch Bridge.	
Capital City Brick and Pipe Co., Des Moines.....	\$74,900
Marsh Bridge Co., Des Moines.....	75,900
Stampon & Bloune, Chicago.....	76,685
George E. King Bridge Co., Des Moines.....	81,600
East Sixth Street Bridge.	
Magden & Sheeley Co., Des Moines.....	\$39,975
Fair Williams Bridge Co., Ottumwa, Ia.....	41,000
American Bridge Co., New York.....	45,300
Des Moines Bridge & Iron Co.....	46,860
Marsh Bridge Co.....	47,500
George E. King Bridge Co.....	52,900
Nat M. Stark Co.....	54,000

EL PASO, TEXAS.—S. P. Hutchinson, Second Vice-President and General Manager of the El Paso & Southwestern R. R., 90 John street, New York City, tells us that his company will build a steel bridge over the Rio Grande near El Paso, Texas, to the New Mexican shore.

FINDLAY, OHIO.—The county is again considering the project of building a bridge over the Blanchard River at Cory street.

FORT DODGE, IOWA.—The Chicago Great Western has determined upon which of the bridges on its proposed extension to Sioux City shall be of steel. They are as follows: Across Maple River, at Ida Grove, one 120-ft. span; across Little Sioux City, at or near Oto, one 180-ft. span; across West Fork of Little Sioux, at Holly Springs, one 80-ft. span; across Garretson's Ditch, one 70-ft. span; across Floyd River, just outside of Sioux City, two spans 100 ft. each. It is expected that some of the preliminary work on these bridges will be done this winter.

FREDERICKTON, N. B.—The Department of Public Works is receiving bids for rebuilding three bridges.

GREENFIELD, IND.—Gilbert Calkins, Box 393, Greenfield, is the engineer for the bridges needed on the electric railroad to be extended from Greenfield to Knightstown. There will be seven bridges in all.

GROVE CITY, ILL.—The Peoria & Pekin Union Ry., according to report, will build a bridge over Lick Creek early in the spring.

HANNIBAL, MO.—The City Council is considering building a bridge over Bear Creek. The City Engineer estimates that it will cost \$70,000.

HENDERSON, N. C.—The Seaboard Air Line, according to report, will build an overhead bridge in Henderson.

HOUSTON, TEXAS.—It is announced that the Southern Pacific will, during the coming year, spend \$3,000,000 on the Atlantic System between El Paso and New Orleans. The improvements include new bridges.

HUNTINGTON, W. VA.—The Huntington Railroad Bridge & Terminal Co., recently incorporated, will build a bridge over the Ohio River at Huntington. J. L. Caldwell, Huntington, is interested.

JACKSONVILLE, FLA.—An ordinance is before the Councils for a viaduct over Duval street from a point east of Hogan's Creek to the east side of Catharine street, crossing the Atlantic, Valdosta & Western tracks. The railroad company will pay the cost.

KANSAS CITY, MO.—The Council is again considering the ordinance providing for a viaduct on Summit street over the Belt Line tracks. It will be built jointly by the Belt Line and the Metropolitan companies. (Construction Supplement, Oct. 11, 1901.)

LEWISBURG, PA.—The State Board of Public Property has approved the proposition of a bridge between Northumberland and Union counties at Lewisburg. It will cost about \$100,000. The State will pay half the cost and the other half will be paid by the counties in proportion to population.

LONDON, ONT.—Two bridges are reported proposed at a total cost of \$27,000. One will be at Muncey and the other near Dunwich.

LOS ANGELES, CAL.—City Engineer Harry F. Stafford has submitted plans to the Council for three bridges mentioned in this column Nov. 1. The total estimated cost of these four structures is as follows: Aliso street bridge, \$23,436; Macy street over the river, \$8,400; Macy street over the Arroyo de los Posas, \$4,209; Pasadena avenue over the Arroyo Seco, \$7,200.

MARIETTA, OHIO.—The contract for the 1,820-ft. steel bridge over the Ohio River for the Ohio River Bridge & Ferry Co. has been let to the American Bridge Co. C. L. Strobel, of Chicago, is the Engineer.

MEMPHIS, TENN.—President Gould, of the Missouri Pacific is reported as saying that his company is considering the advisability of building a bridge across the Mississippi at Memphis to cost \$3,500,000.

MERRILL, MISS.—We are told that bids will soon be wanted by the Mobile, Jackson & Kansas City R. R. for a bridge of 210 ft. span. H. S. Jones, Chief Engineer.

MILWAUKEE, WIS.—The Common Council committee on viaducts has voted in favor of getting plans and estimates for a viaduct on Kinnikinnic avenue over the Chicago & North Western and the Milwaukee roads. It will be about 1,750 ft. long.

MONTGOMERY, ALA.—We are told that bids are wanted, Jan. 15, by John W. Watts, President of the Montgomery Northern Ry., 29 Commerce street, Montgomery, for a steel bridge over Tallapoosa River, which will be 350 ft. long and cost about \$25,000.

MORGANTOWN, W. VA.—A bill was introduced in the House of Representatives last week authorizing a bridge across the Monongahela River, at or near Morgantown.

NEW BRUNSWICK, N. J.—The contract for the four-track bridge of stone arches over the Raritan River at New Brunswick for the Pennsylvania R. R., has been let to H. S. Kerbaugh, Inc., of Philadelphia.

NILES, OHIO.—The County Commissioners are considering building a bridge at Robin's avenue.

NORRISTOWN, PA.—It is said that bids will soon be wanted by the Philadelphia & Reading for the proposed bridge over the Schuylkill River at this place.

NORTHFIELD, MASS.—G. A. Moody, Secretary of the Bridge Committee, who is having plans made for a bridge over the Connecticut River to Greenfield, tells us that it will be a cantilever structure about 512 ft. long.

OMAHA, NEB.—A bill has been introduced in the U. S. Senate amending previous Acts authorizing a bridge across the Missouri River near Council Bluffs, Iowa, and Omaha, Neb., and authorizing the Omaha Bridge & Terminal Company to complete, rebuild and change the bridge for railroad and street railroad uses. I. L. Waddell, of Kansas City, Mo., Engineer.

OXFORD, PA.—The Franklin County Board of Freeholders has ordered a bridge at Hoagland's. Bids are asked.

PASSAIC, N. J.—The Delaware, Lackawanna & Western has a plan to build a bridge over the tracks at Colfax avenue, Athenia. The work will be done as soon as the Board gives its authority.

PHILADELPHIA, PA.—The Council is considering appropriating \$25,000 for a stone arch bridge over the Wissahickon, on the line of Allen's Lane, to replace the bridge washed away last spring. The work will be done by the Commissioners of Fairmount Park.

PORT HASTINGS, PRINCE EDWARD ISLAND.—Messrs. Ross & Ross, of Sydney, N. S., write us that there are no particulars to be given out regarding the bridge proposed over the Strait of Canso, mentioned in this column Nov. 29. The officers of the company have not been elected and the survey will not be made until the charter is granted.

PUEBLO, COLO.—The City Council has named a committee to arrange for building the viaduct on Mesa avenue.

ST. JOSEPH, MO.—In the U. S. Senate, on Dec. 9, a bill was introduced authorizing the Chicago, Rock Island & Pacific to build a bridge across the Missouri River, near St. Joseph, Mo.

SANATOGA, PA.—The viewers from both counties have selected a site for the bridge proposed over the Schuylkill River from near Sanatoga. It will be a steel structure about 428 ft. long and will cost about \$28,000. (Nov. 15, p. 796.)

SHAMOKIN, PA.—A favorable report has been made by the viewers for the proposed bridge at Market street.

STEELTON, PA.—Arthur T. Rupley gives notice that application will be made in Pennsylvania on Jan. 2 for the incorporation of the Steelton & New Cumberland Bridge Co., which proposes to build a bridge over the Susquehanna River from near Myers street in the Borough of Steelton to New Cumberland. Among those interested are Jacob H. Foreman, W. Stuart, Harry Hertzler and H. W. Smith.

SULLIVAN, IND.—The County Auditor tells us that several bridges are proposed, but proposals are not yet advertised for.

TOLEDO, OHIO.—We are told that plans will probably be ready within 60 days for the 2,900-ft. bridge over Maumee River for the Toledo Railway & Terminal Co. S. D. Williams, Jr., Chief Engineer, 513 Nasby Building, Toledo, Ohio.

UTICA, N. Y.—The Councils are considering the advisability of rebuilding the bridge at First street over the Erie Canal.

WEST ELIZABETH, PA.—The West Elizabeth & Dravosburg Bridge Co. was incorporated early this month, with a nominal capital stock, which will be increased when the company is ready to build its proposed bridge over the Monongahela River from Port Vue, Allegheny County. The directors are: J. A. and W. T. Pierce, of McKeesport; R. H. Askey, of Allegheny. Pa.; J. A. Pierce is Treasurer.

WICHITA, KAN.—The City Engineer is making plans for a steel viaduct on First street over the tracks of the three railroads. It will be about 1,400 ft. long.

WILMINGTON, N. C.—A steel bridge is proposed at Fifth street at a cost of \$4,500.

WOONSOCKET, R. I.—The City Council is considering the advisability of spending \$32,000 on rebuilding the Globe bridge.

Other Structures.

COLUMBUS, OHIO.—The Cleveland, Cincinnati, Chicago & St. Louis, we are told, contemplates making improvements at Columbus which, at present, include rebuilding the engine house, turntable and coal chute and remodeling the train yard at a total cost of about \$25,000.

FERNIE, B. C.—The Canadian Pacific has plans and specifications ready for the new depot at a cost of \$25,000.

GRAND FORKS, B. C.—The Republican & Grand Forks, according to report, will build a \$20,000 station in this city.

HALIFAX, N. S.—The Intercolonial Ry. is advertising for bids for alterations and additions to be made to the station in this city. D. Pottinger, General Manager, will furnish plans and specifications.

LOS ANGELES, CAL.—The San Pedro, Los Angeles &

Salt Lake R. R., according to report, has let contracts for a 41-stall roundhouse to Andrew Beyrle at about \$25,000. It is said that other contracts will soon be let.

MONESSEN, PA.—The Monessen Foundry & Machine Company has bought fire acres of Monongahela River frontage at Monessen and has let a contract to the American Bridge Company for a steel building 72 x 250 ft., to be used as a foundry.

SELMA, ALA.—The Louisville & Nashville, according to report, will build a new passenger station here.

TOPEKA, KAN.—The Atchison, Topeka & Santa Fe is considering enlarging a number of roundhouses to accommodate the larger engines.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvii.)

Western Society of Engineers.

At a meeting of the Western Society of Engineers, Wednesday evening, December 18, Mr. J. Macdonald presented a paper on "Fire-Proof Grain Elevator Construction."

American Society of Civil Engineers.

At the meeting of the Society on Wednesday, Dec. 18, a paper by Charles H. Tutton, entitled "A Proposed Solution of Some Hydraulic Problems," was read and discussed.

Rocky Mountain Railway Club.

The December meeting will be held at the New St. James Hotel on Saturday, the 21st inst., at 7:30 p.m. Topical discussion: "What Is the Best Type of Freight Car Draft Gear?" Discussion to be opened by J. M. Hines.

Papers: "Some Notes on Air Brakes," by Ben Johnson, Superintendent Machinery, Mexican Central Railway; "Air Brake Maintenance," by T. A. Hedendahl, Westinghouse Air Brake Company. Mr. Johnson's paper will be discussed at the December meeting.

Pacific Coast Railway Club.

At the meeting of the Club, held on Nov. 16, Prof. L. P. Breckinridge and his assistant, E. C. Schmidt, of the Department of Mechanical Engineering of the University of Illinois, read a paper on "The Dynamometer Car and Its Uses."

New York Railroad Club.

A regular meeting of the Club was held at 349 Madison avenue, New York, at 8 o'clock, p.m., of Thursday. The paper of the evening was presented by Mr. H. L. Joyce, Manager, Manhattan Lighterage & Transportation Co., entitled, "Harbor Lighterage and Transportation."

Freight Claim Association.

The tenth semi-annual meeting, which was to have been held at St. Augustine, Fla., January 8, 1902, is abandoned. This course has been urged by a large number of members for the reason that there is no business of especial importance and because of the uncertainty of the Eastern lines granting passes to members who do not feel justified in paying fare.

The Engineers' Club of Philadelphia.

A regular meeting of the club will be held on Saturday, December 21, 1901, at 8 o'clock p.m. The twenty-fourth anniversary of the organization of the club will be celebrated at this meeting. The exercises will consist of a brief address by the President of the club, followed by an illustrated talk upon "Some of the Great Things which Make our Country Great; with Special Reference to Engineering Construction," by Mr. John Birkinbine.

Franklin Institute.

At the meeting of Physical Section, on Dec. 17, Harvey M. Watts read a paper on "The Mechanism and Causation of Hot Waves."

On Dec. 18, at the stated meeting of the Institute, the following was the programme: An address by Gen. Joseph Wheeler, U. S. A., "On the Evolution of Small Arms and Ordnance," with remarks by Dr. Samuel N. McClean, "On Automatic Rapid-Fire Non-Recoiling Guns." Dr. Henry Leffmann made some remarks on "The Proposed Forest Reserve in the Southern Appalachian Mountains."

"The Parallel Operation of Alternating-Current Generators," by Mr. Paul M. Lincoln, Electrical Engineer, Niagara Falls, N. Y., was the subject before the Electrical Section on Dec. 19.

Central Railway Club.

The next regular meeting of the Central Railway Club will be held at the Hotel Iroquois, Buffalo, N. Y., on Friday, Jan. 10, 1902, at 2 p.m., the Executive Committee meeting at the same place at 1 p.m. As this will be the annual meeting, officers will be elected for the ensuing year.

Last year's programme of entertainment will be repeated—a luncheon at the hotel immediately after adjournment of the meeting, and a visit to one of the theaters in the evening.

Subjects and committees to report thereon at the coming session are as follows:

"Best Methods in Shop Practice in Meeting Requirements for the Maintenance of All-Steel Cars; Probable Future Shop Changes Necessary." Committee: G. N. Dow, Chairman; James Macbeth and H. A. Fergusson.

"Best Improvement in Boiler Design and Best Proportions of Heating and Grate Surface for Different Kinds of Coal." Committee: C. H. Hogan, Chairman; J. H. Moore and H. A. Fergusson.

Nominations for officers for the ensuing year: Committee: John S. Lentz, Chairman; G. N. Dow, A. C. Robson, John Mackenzie and L. T. Canfield.

Entertainment: E. C. Neal, Chairman; L. H. Van Allen, S. H. Jones, Henry M. Brown, B. M. Tate, Pemberton Smith and H. C. Edson.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. D. D. Tracy, a Director of the Erie & Pittsburgh (Pennsylvania Company), died Dec. 9.

—Mr. H. W. Hancock, Auditor of Coal Traffic of the Philadelphia & Reading, died Dec. 16, at Philadelphia, aged 57 years.

—Mr. Charles A. Prouty, of Vermont, was reappointed on Dec. 12, by President Roosevelt, to be an Interstate Commerce Commissioner for a term of six years from Jan. 1, 1902.

—From Freight Traffic Manager Mr. G. M. Bosworth assumes the duties of Fourth Vice-President in charge of traffic matters of the Canadian Pacific. Mr. Bosworth was, previous to 1885, General Freight Agent of the Eastern Division of this company. For ten years (1885-1895) he was Assistant Freight Traffic Manager of the lines east of Port Arthur and was appointed to the position of Freight Traffic Manager in May, 1895. Mr. Bosworth's position is a new one recently created.

—Mr. George Gibbs has been appointed Consulting Engineer to the Rapid Transit Subway Construction Company in New York City, and will take up his residence in New York. So far as we know he retains his other business connections. As Consulting Engineer for the Rapid Transit Company he will have special charge of railroad work so far as concerns motive power, trains, track, block signaling, and other matters of equipment and operation in which he is especially qualified.

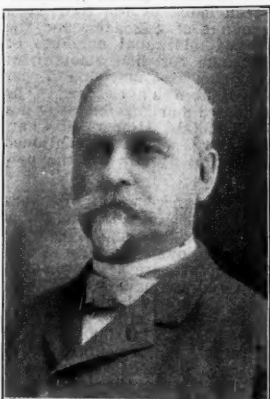
—Mr. Newton Heston, who has recently been appointed Purchasing Agent of the Seaboard Air Line to succeed Mr. Sanderson, began his career as a stenographer on the Norfolk & Western in 1881. In 1885 he was transferred to the Purchasing Agent's department and five years later was appointed Chief Clerk to the Purchasing Agent. In 1898 Mr. Heston resigned from railroad service to become Assistant Secretary and Treasurer of the Thornton N. Motley Company, later becoming its Secretary.

—Mr. I. G. Ogden, the new Third Vice-President of the Canadian Pacific, was born Oct. 10, 1844, in New York City. His railroad career dates from 1871, when he began as a paymaster and accountant for the Chicago & Pacific, now known as the Chicago, Milwaukee & St. Paul. In 1876 he was Auditor under the Receiver for the same company. This position he held for five years, and at the end of which time he took a similar position on the Western Division of the Canadian Pacific, and in 1887 became Comptroller, from which position Mr. Ogden has been promoted.

—Mr. Alfred M. Underhill, Engineer of Maintenance of Way of the Vandavia Line, died Dec. 17, at the age of 36 years. Mr. Underhill was born at Clinton Corners, Dutchess County, N. Y., and was a graduate of Haverford College. He began his railroad service in 1886 as a draughtsman for the Chicago, St. Louis & Pittsburgh. This position he held for two years, at the end of which time he became Assistant Engineer of the Pittsburgh, Cincinnati & St. Louis. From 1891 to 1895 he held a similar position on the Pittsburgh, Cincinnati, Chicago & St. Louis, and was from the last named year (1895) Engineer of Maintenance of Way of the Peoria Division of the Terre Haute & Indianapolis.

—The new General Manager of the Davenport, Rock Island & Northwestern, Mr. Oscar B. Grant, received his education at the Stamford Seminary and entered railroad service in 1873 as an operator on the Ulster & Delaware. The following year (1874) he became operator and clerk to the Superintendent of the Indianapolis & Vincennes. For eight years he was with the Jeffersonville, Madison & Indianapolis (Pittsburgh, Cincinnati, Chicago & St. Louis) and at the end of that time (1887) he went with the Chicago, Milwaukee & St. Paul as Assistant Despatcher. Then for three years Mr. Grant was out of railroad service, but re-entered it in 1892 as Chief Clerk to the Assistant General Superintendent of the last-named company. He then spent three years with the Great Northern, and in 1897 was appointed Superintendent and Assistant Treasurer of the Mason City & Fort Dodge, from which position he resigned to go with the Davenport, Rock Island & Northwestern. Mr. Grant is 48 years of age.

—At a meeting of the Board of Directors of the Safety Car Heating & Lighting Company, held Dec. 11, Col. Robert Andrews, heretofore the Vice-President of the Company, was elected to the Presidency of the Company, vice Arthur W. Soper, deceased. The vacancy in the Board of Directors was filled by the election of Mr. A. C. Soper to serve on the Board. Mr. A. C. Soper is a brother of the late Arthur W. Soper. Col. Andrews is well known in railroad life. He was born in Wilmington, Del., and attended school at the Episcopal Academy at Cheshire, Conn., from which he was graduated in 1849.



After leaving the Academy, he entered Trinity College at Hartford, where he was graduated in 1853. He then took a course in the Polytechnic College at Philadelphia, graduating in 1854. His first position was that of Assistant Engineer of the State Canals of Pennsylvania, in which capacity he served from 1854 to 1857, his next appointment being that of Principal Assistant Engineer of the Sunbury & Erie Railroad, and he served that company for the three years from 1857 to 1860. From 1861 to 1864 he was a staff

officer in the army. From 1864 to 1865 he was Chief Engineer of the Saratoga & Hudson River Railroad, and for the 20 years from 1865 to 1885 he served the Wabash Railroad as Division Superintendent, Chief Engineer and General Superintendent. From 1885 to 1888 he was General Superintendent and Engineer of the Virginia Midland Railroad, and from 1889 to 1901 Vice-President of the Safety Car Heating & Lighting Company and the Pintsch Compressing Company. This brings his record up to the time of his election to the Presidency of both the last-named companies.

—Mr. William Rich Hutton died at his home in Maryland, Dec. 11. He was born in Washington, D. C., March 21, 1826, and was educated as a civil engineer. His work has been extensive and important. He was chief engineer in the construction of the Washington Aqueduct in Washington, D. C.; of the Chesapeake & Ohio Canal, and of the Washington Bridge over the Harlem in New York City. He was also for a time chief engineer of the Hudson Tunnel, and at one time was chief engineer of the Western Maryland Railroad. His

reading and observation were broad and he had an unusual range of professional interest and information. He became a member of the American Society of Civil Engineers, Jan. 8, 1873, and served as Vice-President of the Society in 1896 and 1898. He had also served in the Board of Directors. He became a member of the Institution of Civil Engineers (British), Dec. 2, 1890, and was also a member of the French Society of Civil Engineers. He was a member of the Century Club, in New York, and spent many of his evenings there. Mr. Hutton was a man of unusually fine taste and breeding, with genial and polished manners, and he had an uncommon circle of acquaintance at home and abroad.

—Mr. Benjamin Reece died this week at Wilmington, Del. We learn of his death only at the moment of going to press and therefore can give few particulars. Mr. Reece prepared for college at Exeter, N. H., having intended to go to Harvard. He did not enter college, however, but went to the Northwest and began work with an engineer corps on the Northern Pacific. Eventually he became a division engineer on the Lake Shore & Michigan Southern and had charge of maintenance and construction on their lines west of Toledo. He had occupied various positions on the engineering staff of other roads. Something like a dozen years ago he entered the service of the Q & C Co. with special duty of developing the use of the Servis tie plate, which was then new to railroad men. In this enterprise Mr. Reece had great success, bringing to it his accurate knowledge of track conditions, and also a naturally analytical and studious mind. It is probably true that no other man in the United States has done so much to develop the correct theory and practice of the tie plate as Mr. Reece. For some years he has been with the Diamond Steel Company, of Wilmington, giving particular attention to the sale of a tie plate made by that company. Mr. Reece has been a prolific writer and speaker on matters connected with track and maintenance of way. He was a good investigator and careful and logical in reasoning. He had broad intellectual interests outside of railroad matters and wrote occasionally for other magazines than those of a strictly technical sort. He was a member of the American Society of Civil Engineers, having joined that body in 1881, and was a member of various other scientific bodies. Few supply men of the United States were so widely known as "Ben Reece." His intelligence, his versatility, and his amiability made him a welcome companion, and, like many other able men, some of his most attractive qualities were also his weaknesses. We doubt if he had an enemy, and certainly he had a great number of friends.

—Mr. Gustav Lindenthal has been appointed Bridge Commissioner of the City of New York. Mr. Lindenthal is well known to most of our readers, particularly because of his professional position and partly through occasional contributions to our columns. Mr. Lindenthal was born in Austria in 1850 and came to the United States in 1874. He has had considerable experience in the building of bridges and buildings, and since 1892 has been practicing as a consulting engineer in New York City. The most important of his bridge work actually built is to be found in Pittsburgh, but he is perhaps most widely known as Engineer, and now President, of the North River Bridge Company; and he has made complete designs for a great suspension bridge to cross the Hudson River somewhere about the latitude of Twenty-third street. Mr. Lindenthal is a member of the American Society of Civil Engineers, of the Institution of Civil Engineers (British) and of various other professional societies. Mr. Low, in announcing his appointment, gave the following brief statement of the reasons which led to his selection: "I am well aware of Brooklyn's vital interest in the Department of Bridges, and I appreciate that ordinarily the Bridge Commissioner may reasonably be appointed from that borough; but the conditions of the moment are exceptional. There are three bridges in course of construction, and the care of the Brooklyn Bridge on the engineering side as distinguished from its operative side, is condemned beyond excuse by the accident of last summer. There is needed, to deal successfully with these conditions, a man of great force of character, of vigor, and of enough confidence in his own judgment not to be afraid to take responsibility. In the meanwhile, the problem of better transit facilities for the old bridge must be solved by changes at the Manhattan end. It is essential, therefore, for any plan that may be proposed that it shall be acceptable to both boroughs. Otherwise every plan proposed from Brooklyn may be defeated, as heretofore, by objections from Manhattan. I believe that Mr. Lindenthal is a man with the necessary qualifications of character and ability; that he is absolutely unhampered, and that as Bridge Commissioner he will consider the interests of the city only. As to all questions of large policy affecting the bridge, the Mayor himself is responsible."

ELECTIONS AND APPOINTMENTS.

Bath & Hammondsport.—W. H. Hallock has been elected Treasurer.

Canadian Pacific.—I. G. Ogden, heretofore Comptroller, has been elected Third Vice-President, and G. M. Bosworth, heretofore Freight Traffic Manager, was elected Fourth Vice-President. T. Hay has been appointed Superintendent of that portion of the Lake Superior Division between White River and Cartier, including Cartier terminal, with headquarters at Chapeau, and C. Murphy becomes Superintendent of that portion of the Division east of Cartier, including the Soo branch, and Chalk River terminals, with headquarters at North Bay.

Central of New Jersey.—W. M. Yount has been appointed Superintendent of Car Service, succeeding F. E. Higbie, resigned, effective Dec. 16.

Chicago & North Western.—The headquarters of H. R. Sanborn, Division Superintendent, have been removed from Lake City to Sioux City, Iowa.

Chicago, Burlington & Quincy Railway (Lessee of C. B. & Q. R. R.).—The officers of this company are: President, George B. Harris; Vice-President, in charge of traffic, Darius Miller; Treasurer, J. C. Peasley; Secretary and Assistant Treasurer, H. E. Jarvis; Assistant Secretary and Assistant Treasurer, T. S. Howland; Assistant Treasurer, A. G. Stanwood, and Assistant Secretary, George H. Earl.

Chicago, Peoria & St. Louis.—T. C. Wellman has been elected Assistant Secretary and Assistant Treasurer.

Chicago, Rock Island & Pacific.—W. B. Leeds has been elected President, succeeding W. G. Purdy, resigned. (Page 867.)

Colorado Midland.—At a meeting held recently G. W. Kramer was elected Vice-President and H. B. Henson, Treasurer.

Evansville & Terre Haute.—D. H. Hillman has been appointed Assistant General Freight and Passenger Agent, succeeding H. R. Griswold.

Gulf, Beaumont & Kansas City.—J. R. Dillon has been appointed General Freight and Passenger Agent, succeeding G. R. Wansbrough.

Hawkinsville & Florida Southern.—R. A. Moore, heretofore Master Mechanic of the Wrightsville & Tennille, has been appointed Master Mechanic of the H. & F. S.

Houston & Texas Central.—R. D. Berrey, Assistant General Freight Agent, with headquarters at Dallas, Texas, has resigned.

Houston East & West Texas.—N. S. Meldrum, General Manager, has resigned.

Iowa Central.—The headquarters of S. G. Lutz, Assistant General Freight Agent, have been removed from Marshalltown, Iowa, to Peoria, Ill.

Mississippi River, Hamburg & Western.—J. D. Moore has been appointed Superintendent and General Freight and Passenger Agent.

Northern Pacific.—J. J. Hill has resigned from the Board of Directors.

Ohio & Kentucky.—M. L. Conley, formerly connected with the engineering force of the New Orleans, Texas & Pacific (Cincinnati Southern), has been appointed General Superintendent of the O. & K., succeeding R. M. Broas, resigned.

Pittsburgh, Shawmut & Northern.—William Barclay Parsons, heretofore Chief Engineer, has been appointed Consulting Engineer. M. F. Bonzano becomes Chief Engineer, succeeding Mr. Parsons.

Seaboard Air Line.—Newton Heston has been appointed Purchasing Agent, succeeding R. P. C. Sanderson, transferred, effective Dec. 15.

It is rumored, and probably true, that L. E. Chalener has been appointed Assistant General Freight Agent, with headquarters at Savannah, Ga.

Southern.—H. W. Miller has been appointed Assistant to the First Vice-President.

Southern Indiana.—W. C. Walsh has been appointed Master Mechanic, succeeding E. S. Walker, resigned.

Toledo, St. Louis & Western.—K. A. Gohring, Superintendent of the Toledo Division, has assumed charge of the St. Louis Division, temporarily.

Virginia & Southwestern.—G. P. Johnson has been appointed Superintendent of Transportation instead of Superintendent, as stated last week, page 867. The position of Superintendent has been abolished.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—It is said that this company will build a cut-off across New Mexico before next fall by means of which direct communication will be established between Panhandle, Texas, and Albuquerque, N. Mex. This will afford the Santa Fe a new connection between Kansas City and its California line, and will also furnish a way around the Raton and Glorieta mountain ranges, which have been a serious hindrance to traffic.

BISMARCK, WASHBURN & GREAT FALLS.—An officer writes in regard to the proposed extension from Coal Harbor, N. Dak., that the location is about three-fourths completed, and it is thought that contracts will be let in January, 1902. The distance is about 22 miles and no work has as yet been done. Building will be easy, with grades of 40 ft. per mile and 6 deg. curves as the maximum. There will be no iron or steel bridges, and no important trestles or tunnels. (Dec. 6, p. 849.)

BOONE, ROCKWELL CITY & NORTHWESTERN.—It is reported that an extension is to be built soon from Gowrie, Iowa, to Rockwell City, 22 miles northwest.

BRITISH COLUMBIA ROADS.—It is said that the following projected railroads in British Columbia will be built shortly: Canadian Northern line from the eastern frontier to the Pacific Coast; Coast-Kootenay line from Midway in the Boundary District to the coast; the Atlin Ry., and the line in Vancouver Island known as Dunsmuir's Ry.

BUTTE, ANACONDA & PACIFIC.—Surveys are reported for two short spur lines aggregating 4½ miles in the vicinity of the Parrot mine, Mont.

CANADIAN PACIFIC.—It is said that a line will be built from the present terminus of the company at Mattawamkeag in Penobscot County, where a junction is affected with the Maine Central to Princeton, 42 miles southeast. Princeton is the terminus of the Washington County R. R., which connects with the Shore Line at Calais. This extension, if built, would give the Canadian Pacific an independent route to St. John.

CHICAGO, BURLINGTON & QUINCY.—Contract for the projected extension from Billings, Mont., 178 miles northwest to Great Falls, is reported to be to McShane & Co., of Omaha, Neb. The road is to run west from Billings nine miles up the Northern Pacific and then go northwest through a gap, and it is reported that work will begin at once. (Nov. 1, p. 764.)

CHOCTAW, OKLAHOMA & GULF.—Contract is reported made with the citizens of Guthrie, Okla. T., for this company's line from Hartshorne, Ind. T. Some considerable work has been done already on this proposed extension which is about 140 miles long.

An officer writes that the current press report that the line is to be extended from Asher, Okla. T., to Dallas, Texas, is without foundation.

COAHUILA & PACIFIC.—During 1901 this company has laid 110 miles of track exclusive of second track and sidings between General Cepeteda and Viesca, in the State of Coahuila, Mexico. (Construction Supplement, Oct. 11, 1901.) Fifty miles more between Viesca and Tarreon are under contract to Scott Bros., of Saltillo, Mexico. (Official.)

DES MOINES, IOWA FALLS & NORTHERN.—During the past year this company has built 15 miles of line between Iowa Falls and Sherman, Iowa, and now has 76 more under contract to the Globe Construction Co., of Iowa Falls, between Iowa Falls and Des Moines. A line is

projected also from Iowa Falls to Osage, 75 miles. Nov. 22, p. 815.) E. S. Ellsworth is President. (Official.)

ERIE.—Surveys are reported for a cut-off between Port Jervis, N. Y., and Lackawaxen, Pa. The present distance between these two points, on the Erie, is 23 miles, and it is expected that the new route will reduce the distance to 11, and eliminate several bridges and a heavy grade.

FORT SMITH & WESTERN.—Contracts for sections of this line between Fort Smith, Ark., and Guthrie, Okla. T., have been let to the Cherryvale Construction Co., of Cherryvale, Kan., the McDonald Construction Co., of Kansas City, and the Fruin-Bambrick Co., of St. Louis, and work is to begin at once. It is thought that the line will be completed next year. (Dec. 13, p. 868.)

FORT WAYNE & DETROIT (WABASH).—An officer writes that grading and bridging on this line in Indiana, which is to extend between New Haven, in Allen County, and Butler, in DeKalb County, is completed and that nine miles of track have been laid. The total length of the road is about 26 miles, and it is thought that it may be finished within 30 days. (Construction Supplement, Oct. 11, 1901.)

FORT WAYNE, DAYTON & CINCINNATI TRACTION.—Ground has been broken for this projected electric line from Cincinnati in a northwestern direction through Ohio and Indiana. The plans of the founders are very bold and include the transportation of freight and passengers by electric trains instead of single cars. The system has been divided into four divisions, one between Cincinnati and Dayton; one from Dayton through Bradford and Greenville to Salina, Ohio; from Salina through Decatur to Fort Wayne, and from Fort Wayne to Bluffton, Portland, Greenville & Eaton, meeting the main line at West Elkton. Work has been begun at the West Elkton end.

GREENBRIER & GAULEY RIVER.—Incorporation has been made in West Virginia of a company to build in Pocahontas County and across to the mouth of the Gauley River in Fayette County. A company was incorporated in 1899, known as the Greenbrier & Cheat River, which was to operate in similar territory, but which has never done anything, and this may be a re-incorporation.

GULF & SHIP ISLAND.—The line between Jackson and Gulfport, Miss., 160 miles, is being relaid with heavy rails, and it is said that this work is a preliminary to double-tracking the entire system between Jackson and Gulfport. At some points the double tracking will proceed simultaneously with the heavy rail laying.

HUNTINGTON R. R. BRIDGE & TERMINAL CO.—Charter was issued in West Virginia, Nov. 14, for a company with the above title to build a railroad from Huntington, W. Va., to a point in Lawrence County, Ohio. The incorporators are: J. L. Caldwell, D. E. Abbott, Dan. A. Mossman, H. B. Hagen and E. Ensign, all of Huntington.

INDIANAPOLIS & GREENFIELD RAPID TRANSIT (ELECTRIC).—An officer writes that the line is being extended from Greenfield, Ind., to Knightstown, 14 miles, and that grading is in progress. There are to be seven bridges on the new line, some of them fairly large. The company at present operates a line 17 miles long between Greenfield and Irvington, Ind., and has trackage rights into Indianapolis from Irvington.

IRONDALE, BANCROFT & OTTAWA.—An officer writes that no building has been done this year on this line in Ontario, but that a new line has been located and a preliminary survey run from the present terminus near Bancroft to a point on the Canada Atlantic near Caldwell, a distance of 60 miles.

KENTUCKY ROADS (ELECTRIC).—It is reported that work will begin at once upon an electric line 20 miles long between Louisville and West Point, Ky. It is thought that bonds to the extent of \$150,000 will be issued to provide for the expense. Samuel Avaritt, of Louisville, is interested.

LAKE SHORE TRACTION.—This company has been incorporated in New York, with a capital of \$280,000, to build an electric road 28 miles long in Chautauqua County. The directors are: Arthur C. Wade, A. N. Broadhead and F. K. Green, of Chautauqua.

MAHONING & ANITA.—This company was incorporated in Pennsylvania, Nov. 27, with a capital stock of \$450,000, to build a railroad 45 miles long from a connection with the Allegheny Valley R. R., near the mouth of Mahoning Creek in Armstrong County, Pa., to Anita, in Jefferson County. A. J. Bond, of Bradford, Pa., is President.

MEMPHIS & ST. LOUIS.—Charter has been granted in Missouri to this company, with a capital stock of \$500,000, to build a railroad from a point on the St. Louis & Memphis, near Paw Paw Junction to Gray's Point, Mo., a distance of 50 miles. The incorporators are S. S. Barnes, L. Barnes, Lawrence Fischer and others of New Madrid, Mo. S. S. Barnes is at present General Manager of a new line in Missouri known as the St. Louis & Memphis, referred to above, which at the time of our Construction Supplement was reported as being graded for its entire length from Portageville, Mo., 20 miles south via Hayti to a connection with the St. Louis, Caruthersville & Memphis.

MISSOURI PACIFIC.—This company has at present the following work under contract: Between Scotland, Mo., and Granby, Mo., 14 miles; from Tripp Junction, Ark., south to the State line, 42 miles; from Bastrop, La., northwest to the State line, 16½ miles; from Batesville, Ark., northwest to phosphate mines, 17 miles, and from Hamburg, Ark., west to sawmills, 12 miles. The contractors are Dodson & Sons, of Bastrop; J. McCarthy, of Little Rock, Ark.; the Joplin Street Improvement & Construction Co., of Joplin, Mo., and J. H. Reynolds, of Batesville, Ark. (Official.)

MOBILE, JACKSON & KANSAS CITY.—An officer writes in regard to a projected extension from a point near Augusta, Miss., to a junction at Laurel with the Kingston & Central Mississippi, that the location is nearly completed and contracts for grading, track laying, etc., will be let soon. The maximum grades are 1 per cent., and maximum curvature 4 deg. The work includes one bridge with a span of 210 ft. Contracts for rails and rolling stock required have already been let. The company intends to issue new securities to meet the cost of the above work. This line is at present in operation between Mobile and Merrill, Ala., 50 miles, and when the entire plans of the company are completed, it will control about 400 miles of railroad in Alabama, Mississippi and Tennessee. (Dec. 6, p. 850.)

MONTREY & MEXICAN GULF.—Surveys are reported for an extension from Trevine, the present western terminus of the line, to a connection with the San Pedro branch line of the Mexican Central, a distance of about 200 miles. These two railroads are controlled by the

same syndicate (H. Clay Pierce), and have at present no western connection, although they join at Tampico.

NEVADA-CALIFORNIA-OREGON.—An officer writes that 16 miles are at present building between Terro, Cal., and Madeline, and that the line is projected between Madeline, Cal., and Lakeview, Ore., 95 miles further, but has not yet been surveyed. (Construction Supplement, Oct. 11, 1901.)

NEW MEXICO ROADS (ELECTRIC).—Franchise has been granted to L. P. Deming, Lucius Deming and T. W. Carter, of New Haven, Conn., and M. W. Porterfield, of Silver City, N. Mex., for an electric line to run between the mining camps of Santa Rita, Fierro, Hanover, Central, Pinos, Altos, the Burro Mountains and Silver City. The line is designed primarily to haul ore.

OMAHA, KANSAS & GULF.—The Kansas State Charter Board has issued a charter for a company which proposes to build a line from Emporia, Kan., to Omaha, Neb., through the counties of Lyon, Wabunsee, Pottawatomie, Shawnee, Jackson, Geary, Riley, Marshall and Nemaha, in Kansas, and thence to the Missouri River at Omaha. The incorporators are F. G. Willard and Franklin Hunt, of Topeka; and H. P. Wright and W. C. Perry, of Kansas City.

OREGON RAILROAD & NAVIGATION.—It is said that a cut-off will be built around Alto Hill, Wash., which has always been an impediment to traffic on the main line between Spokane and Walla Walla.

PANHANDLE & GULF.—H. C. Hord, General Attorney for this company, which is the Texas corporation for the Kansas City, Mexico & Orient, announces that 40 miles of grade of the Panhandle & Gulf has been completed south from the Red River in Texas, and the grading on the line north from Sweetwater, on the Texas and Pacific is to begin at once.

PENNSYLVANIA WESTERN & OHIO RIVER CONNECTING.—This company was incorporated in Pennsylvania, Nov. 27, to build a steam railroad from a connection with the Pittsburgh, Fort Wayne & Chicago at or near Spruce street, in the city of Allegheny, to a point on the western line of the property of the Pittsburgh Forge Iron Co., in the same city, a distance of three-fourths of a mile. Clavin Wells, of Allegheny, Pa., is President.

PRINCE EDWARD ISLAND.—This company has at present 42½ miles of line under contract to Willard Kitchen, of Orwell, P. E. I., between Charlottetown and Murray River, and the line is projected from Murray River to Murray Harbor, seven miles additional. H. J. Mackenzie is the Engineer in charge. (Official.)

RUMFORD FALLS & RANGELEY LAKES.—An officer reports work in progress between Bemis and Kennebec, Me., by way of Mountain View at the west of the Rangeley Lakes, a total of 22 miles. The line has also been surveyed from Kennebec to the International boundary, 20 miles northwest. (Nov. 8, p. 782.)

ST. JOHN VALLEY & RIVIERE DU LOUP.—This is the correct name of the company referred to Nov. 22 (p. 816) as the Woodstock & Centreville, which has been granted by the Government a bonus of \$3,200 per mile for 22 miles from the village of Prince William to the town of Woodstock, N. B., and a later one of \$3,200 per mile from Woodstock towards Centreville, not to exceed 20 miles distance at present. Contract is reported let to an American company for this work.

SANDWICH, WINDSOR & AMHERSTBURG ELECTRIC.—Application is being made to the Ontario Parliament for an act to amend this company's charter so as to enable it to extend its line from Amherstburg, Ont., through Colchester to Harrow; also to build a line east from Sandwich to a point near the village of Tecumseh. Power to issue bonds or other securities to the extent of \$1,000,000, including bonds now outstanding, is also asked. The proposed extensions aggregate about 30 miles. See South Essex Electric.

SOUTHERN PACIFIC.—Plans are reported made for very extensive improvements on the main line between Orange, Texas, and El Paso, a distance of about 900 miles. The proposed improvements involve an outlay of nearly \$3,000,000 and will include relaying of stone ballast, new rails, new bridges, additional side tracks and other betterments. (July 12, p. 508.)

SOUTH ESSEX ELECTRIC.—The franchise of this company has been bought by the Everett-Moore Syndicate of Cleveland. The charter and franchise cover a line from Windsor, Ont., 32 miles in an air line southeast to Point Pelee and Leamington, and it is said that work will be begun at once. This project would operate in practically the same territory as the proposed extension of the Sandwich, Windsor & Amherstburg, above.

SUMPTER VALLEY.—It is said that this line is intending to start work soon on an extension to run in a southwestern direction through Grant County, Ore., from Whitney into a country which is not at present served by any railroad. (Construction Supplement, Oct. 11, 1901.)

TOLEDO & CHICAGO (WABASH).—An officer writes that work on this line, incorporated last March to build between Montpelier and Maumee, Ohio, is completed, and that the road will probably be open for business about Jan. 1. The distance between the points named is 49 miles.

TORONTO SUBURBAN ELECTRIC.—Surveys are reported for an extension of this company's line in Ontario from Lambton Mills to Hamilton, 40 miles southwest. F. Turner, of Toronto Junction, is President.

TRENTON & NEW BRUNSWICK (ELECTRIC).—This company was incorporated in Trenton, Dec. 10, with \$1,000,000 capital. It is understood that it is the plan of the incorporators to take the first steps toward the electric line between New York and Philadelphia. The charter recorded covers 23 miles of this route between Milltown and Trenton, N. J., which it is proposed to operate by third-rail. It is intended to lay the line entirely upon private right of way and it is to be rock ballasted. Large amounts of land have already been purchased.

UNADILLA VALLEY.—It is said that this line, now in operation between Bridgewater and New Berlin, N. Y., 19 miles, will be extended next spring from the New Berlin end 18 miles east to Oneonta, and from the Bridgewater end 17 miles northeast to Utica. (Nov. 22, p. 816.)

WADLEY & MOUNT VERNON.—At a meeting of the stockholders, held Nov. 23, an amendment to the charter of the company was applied for, asking the right to build their proposed extension from Rixville, Ga., to Valdosta, 140 miles traversing the counties of Emanuel, Montgomery, Laurens, Dodge, Telfair, Wilcox, Coffee, Irwin, Berrien, Clinch and Lowndes. Five miles of this line are now in operation and surveys have been made for considerable distance beyond.

WARREN & CORSICANA PACIFIC.—Plans are reported for an extension north from the present terminus of the road in Polk County, and the bonds recently asked for are to be applied in part to this work. (Nov. 22, p. 816.)

WARRIOR SOUTHERN (SOUTHERN).—Contract for this line, projected to run from an extension of the Mobile & Ohio at Searcy, near Tuscaloosa, Ala., 38 miles northeast to Ensley, outside of Birmingham, has been let to W. J. Oliver & Co., of Columbia, S. C., and work is to begin at once. (Oct. 25, p. 746.)

WATERLOO & CEDAR FALLS RAPID TRANSIT (ELECTRIC).—An officer writes that surveys have been made from Denver, Iowa, to Sumner, in Bremer County, Iowa, 26 miles distant. A line has been completed between Waterloo and Denver. It was designed that this line should be operated by electricity for its passenger service and by steam for its freight service. (Construction Supplement, Oct. 11, 1901.)

WISCASSET, WATERVILLE & FARMINGTON.—During the year this company has built 12 miles of road in Maine between Weeks Mills and North Vassalboro. Two miles are now building to Winslow from Vassalboro, under contract to the Franklin Construction Co., of Philadelphia, and the line is projected from Winslow to Farmington, a distance of 38 miles. (Construction Supplement, Oct. 11, 1901.) G. P. Farley, Wiscasset, Me., is General Manager. (Official.)

ZANESVILLE, MARIETTA & PARKERSBURG.—This company was incorporated at Columbus, Ohio, Dec. 12, by R. C. Burton and O. N. Townsend, of Zanesville; J. T. Blair, of Greenville, Pa.; E. D. Fulton, of Uniontown, Pa.; and T. B. Crosby, of Marietta, Ohio. It is proposed to build along the east bank of the Muskingum River from Zanesville to Marietta, and thence to Parkersburg and the West Virginia coal fields. The distance between Zanesville and Parkersburg is about 100 miles. It is thought that Wabash is interested as the Ohio & Kanawha runs along the opposite bank of the Muskingum River.

GENERAL RAILROAD NEWS.

CANADA SOUTHERN.—At a recent meeting of the directors an increase was made in the rate of dividends ½ of 1 per cent. for the half year, making a total of 2½ per cent. for the year, against 2 per cent. for the year previous.

CHOCTAW, OKLAHOMA & GULF.—It is said that an issue is to be made of equipment trust bonds maturing yearly in eight series, bearing interest at the rate of 4½ per cent. The Girard Trust Co. and Edward B. Smith & Co., of Philadelphia, have purchased the trust loan, which will cover part of a proposed expenditure of \$2,000,000.

CINCINNATI, RICHMOND & MUNCIE.—This company, operating a line at present between Fowlerton and Cottage Grove, Ind., 81 miles, has increased its capital stock from \$850,000 to \$2,250,000 to permit of extension to North Judson, 83 miles, where a connection will be made over another line to Chicago.

LAKE SHORE & MICHIGAN SOUTHERN.—Additional 3½ per cent. gold bonds, maturing in 1907, have been listed by the New York Stock Exchange to the extent of \$2,359,000. The new bonds were issued as follows: To exchange for outstanding second mortgage bonds, \$329,000; for premium on the same, \$30,000, and for cash sale \$2,000,000. The old bonds outstanding consist of the remainder of the second mortgage 7 per cent. 1903 bonds, amounting to \$6,312,000. The new issue brings the total amount listed to date up to \$43,119,000.

OZARK & CHEROKEE CENTRAL.—This company has filed a mortgage deed to the Illinois Trust & Savings Bank, of Chicago, which secures a bond issue of \$2,000,000 on the line between Fayetteville and Muscogee, Ind. T. The total length of the line is 100 miles, of which 30 is almost completed, and work is in progress on the remaining 70. The Kenefick Co. are the contractors.

ROCHESTER & SODUS BAY (ELECTRIC).—This company has been authorized to issue \$750,000 preferred stock in addition to \$1,000,000 common stock in existence. The new preferred stock is 4 per cent. cumulative, and is all outstanding. The Rochester & Sodus Bay extends between the points named in New York State, a distance of 39 miles, and was opened for business in August, 1900.

SOUTHERN.—Additional first consolidated 5 per cent. gold bonds of 1904 have been listed by the New York Stock Exchange to the amount of \$428,000, and the listing from time to time of additional amounts of these bonds issued in exchange for like amounts of Charlotte, Columbia & Augusta first mortgage 7 per cent. extended bonds, due in 1909, was authorized. The total amount of first consolidated mortgage bonds is not at any time to exceed \$35,275,000. Holders of Charlotte, Columbia & Augusta bonds as above mentioned have the privilege of exchanging at par for the new Southern bonds.

UTICA & MOHAWK VALLEY.—The \$1,400,000 of bonds offered for sale by N. W. Harris & Co. (Dec. 13, p. 868) are a part of a total authorized issue of \$4,000,000 which is to be applied as follows: Issued and outstanding, \$1,400,000; reserved to retire a like amount of additional bonds of acquired companies, \$750,000; to be issued on completion of lines now building, \$350,000; to be issued as part cost of 16 miles of line between Herkimer and Little Falls, \$200,000, and, in escrow for future additions and improvements, \$1,300,000. These last can only be issued for 75 per cent. of the actual cash cost of additions and betterments, and not until the net earnings for the preceding 12 months are equal to or exceed double the interest on the total amount of bonds outstanding, including those to be issued.

WASHINGTON, WESTMINSTER & GETTYSBURG (ELECTRIC).—Mortgage has been filed in the office of the clerk of the Circuit Court for Frederick County, Md., and the Union Trust Co., Philadelphia, to secure an issue of \$1,850,000 5 per cent. gold bonds. It is said to be a preliminary to the building of the projected line from Rockdale, Md., 78 miles north to Gettysburg, Pa., with a branch to Frederick, and trackage rights into Washington over the Baltimore & Ohio. The line is under contract for its entire length. James B. Colegrove, of Washington, D. C., is President.

WILKESBARRE & WESTERN.—This line, which runs from Watsontown, Northumberland County, Pa., to Orangeville, 30 miles, is to be sold at trustees' sale. The road has not paid interest on its bonds since 1895. The Central Trust Co., of New York, trustee, announces that the sale will take place at Philadelphia, March 10, 1902.